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[Communicated.]

New Oil Gas Plant of the Portland (Ore.) Gas and Coke Company.

Many of our Pacific Coast cities have shown phenomenal growth during the last 10 years, but few people realize the remarkable increase in population that has been registered in Portland, Ore. From 90,000 (in 1900) the city had grown to 207,000 in 1910, per United States census, an increase of 130 per cent. To keep pace with this remarkable growth, of course, the Gas Company has been compelled to make many changes and improvements from time-to-time.

In that fuels, except crude oil, are very expensive in the Coast region, and as a very good quality of gas, practically of the same composition as coal gas, can economically be made from oil, nearly all the gas sold on the Pacific Coast is made from crude oil, so plentifully found in California.

Ten years ago about 125 millions cubic feet of gas were sold in Portland, and in 1912 this had increased to 1,500 millions cubic feet; the peak load at present is about 7 millions cubic feet per day. This tremendous increase is not alone due to the gain in population, but much more to the energetic management, modern methods, and active new business department of the Portland Gas and Coke Company, of which Mr. Hilmar Papst is the well-known and well-liked General Manager.

The old gas plant, built in 1859, was located in what is now the heart of the business center. Originally coal gas was made in this plant, but about 15 years ago the system was changed to the manufacture of carbureted water gas, and it was converted in 1907 to an oil gas plant, since which time California crude oil has been used for gas manufacturing purposes. About two years ago it became necessary to change the location of the plant, and Mr. Charles F. Adams (Portland's prominent banker, and former President of the Portland Gas and Coke Company), having foreseen this possibility several years ago, purchased a large tract of land alongside the Willamette river, about 4 miles down stream from the old gas works, and only a short distance from where this river flows into the mighty Columbia.

The new site, being lowland, was flooded every spring, when the Columbia went on a rampage, hence it was necessary to raise the level about 20 feet. That was done by pumping sand and silt from the bottom of the Willamette river, and this made ground has proven well suited for supporting heavy loads. No trouble has been experienced with the foundations, the footings of which were generously proportioned.

This dredging of the Willamette provided a deep water channel alongside the plant, and a dock was built, where large ocean steamers can now unload.

Under the supervision of the Company's engineer, Mr. E. L. Hall, the buildings of the new plant were designed for a capacity of 20 million cubic feet of oil gas per 24 hours; but at the present time only 3 oil gas sets have been installed to make 7½ millions cubic feet daily. The piping, etc., has been proportioned so that, in the not too far future, 20 millions cubic feet can be made without there being necessity of making changes therein. In fact, the plant has been arranged for an additional future unit of 20 millions cubic feet.

The buildings, which are plain, but of very substantial and impressive design, as seems appropriate for structures owned by an important public service company, are all made of reinforced concrete, with steel roof-trusses and asbestos covering. They are fireproof throughout, with neither wood nor other inflammable material having been used in the construction at any point, and are grouped in very attractive manner, with plenty of space for walks, driveways and green lawn. Indeed the whole works' plan presents a most pleasing picture from the adjoining roadway, as well as from the river, the latter running along at the opposite side of the property.

The generator house is designed for 2 rows of 5 oil gas generators, 20 feet diameter, space being left at one end of the building for 8 motor driven blowers. The initial installation consists of three 20 feet generators; the seals, tar and cooling scrubbers being supported on structural steel, and placed outside the building. Sufficient stairways, galleries and runways afford quick and easy access to all parts, as plainly shown in the accompanying illustrations.

The 24-inch outlets of the cooling scrubbers connect into a 36-inch outlet header, provided with expansion joints to allow for differences in temperature, and the gas is forced through a 42-inch pipe into a relief holder of 750,000 cubic feet capacity. From this relief holder the gas is sucked through a 10-feet diameter, naphthaline scrubber, by means of exhausters of the centrifugal type, each exhauster being driven by a 50-horse power induction motor, and the gas is cleaned in a multiple gas washer before it enters the purifiers.

The oxide purifiers, 32 feet diameter and 20 feet high, are arranged for both duplex or simplex operation, and are provided with large openings in tops and sides for the putting in and removing of the iron sponge. The material is revivified *in situ*, at regular intervals, by passing air through the same. After the gas has been purified, it is passed through a reheating plant, in which nearly all of the or-

Fig. 1.—View of Gas Plant from Nearby Hill.

Fig. 4.—Generator House.

Fig. 2.—Storage Holder, Office and Meter House.

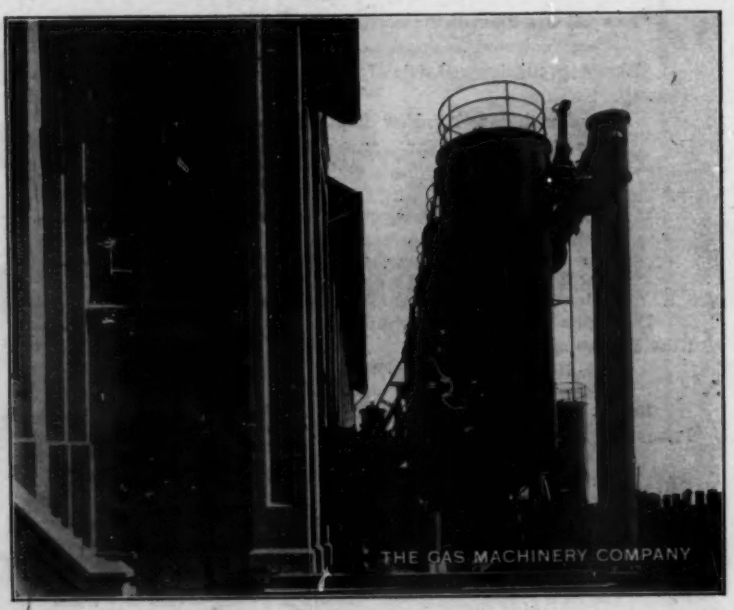


Fig. 5.—Oil Gas Washers and Scrubbers.

Fig. 3.—Machinery and Boiler House.

Fig. 6.—Oil Gas Generators 20 foot Diameter.

ganic sulphur contained in the gas is broken up into sulphureted hydrogen, in accordance with the patented Hall process, which sulphur compound is then removed by passing the gas through a set of secondary purifiers. The gas treated in this manner is practically free from sulphur, notwithstanding the fact that the crude oil used in Portland has at times contained as high as 3 per cent. thereof. After the gas is purified it is measured, and at the present time two 16 feet station meters are in use.

From the meters the gas goes into the storage holder, which has a capacity of only 500,000 cubic feet, and is, therefore, comparatively very small; but the gas has to be pumped from the plant to large distributing holders, located about 4 miles from the new works, hence the storage holder at the new plant should in reality only be considered a transfer holder. The gas is transferred from this holder, through a 16-inch high pressure line, to the distributing holders, by means of two compressors, of the cross-compound condensing type.

The boiler room equipment consists at present of 2 B. & W. boilers, each rated at 300-horse power, but capable of standing a large overload with oil firing, and built for a working pressure of 200 pounds. The furnaces are made for oil firing.

As a great deal of power is required around the plant, and electric

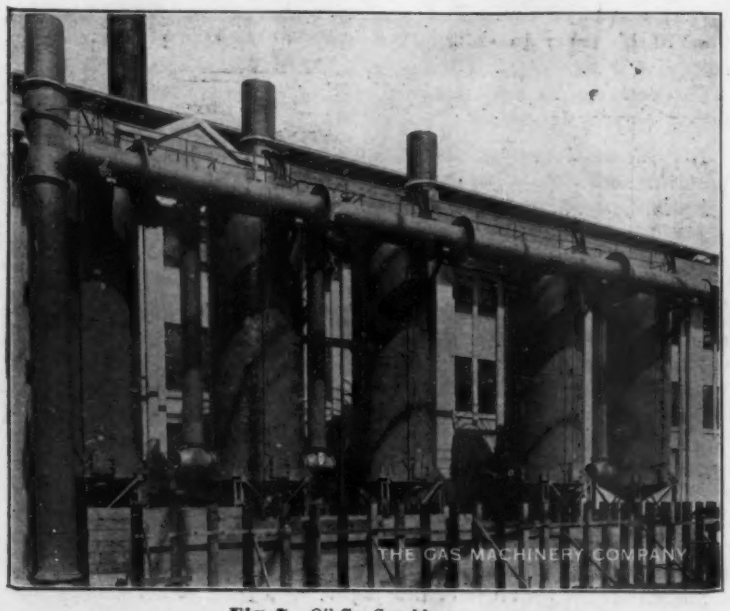


Fig. 7.—Oil Gas Scrubbers.

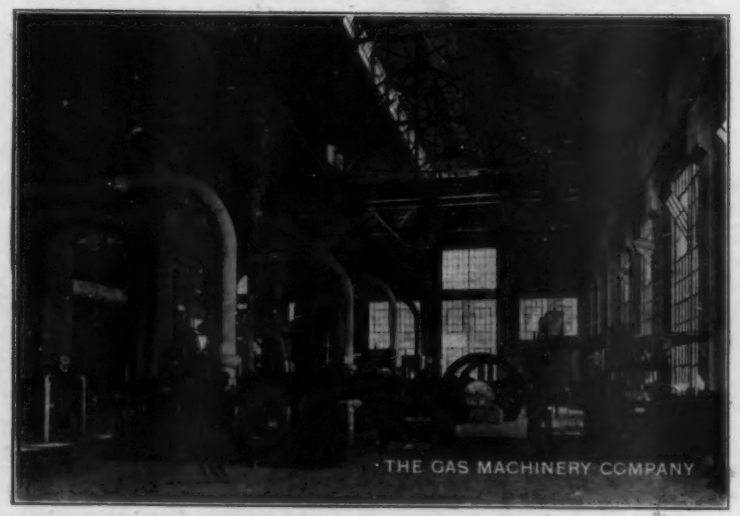


Fig. 8.—Turbo-Generators and Machinery.

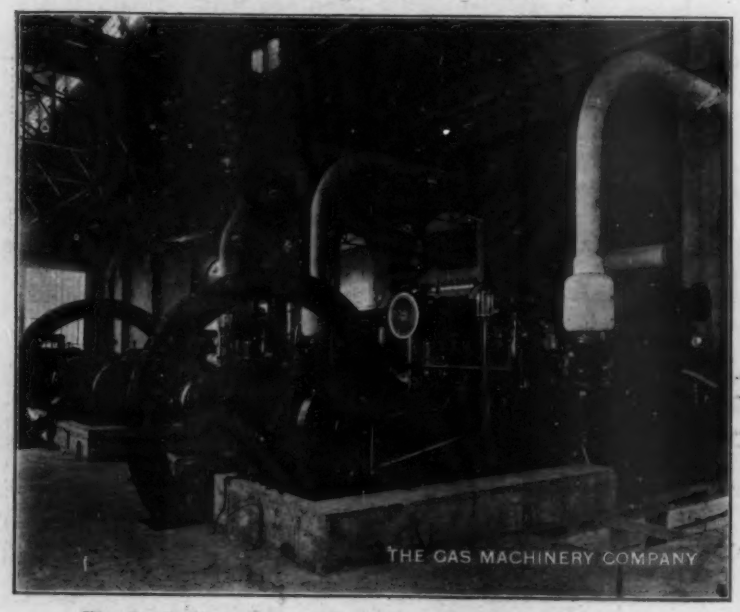


Fig. 9.—Gas Compressors to Pump Gas to Distributing Holders.

power was deemed the most desirable for the local conditions, on this account two 500-Kw. turbo-generators were installed, with condensers and auxiliaries, which furnish all the current required for power and light.

The large quantity of water required for the oil gas plant is pumped from the Willamette river, and forced by 2 motor-driven centrifugal pumps, each of a capacity of 1000 gallons per minute, through a 20-inch steel pipe, into a water tower. The construction

Fig. 10.—Oxide Purifiers and Gas Washer.

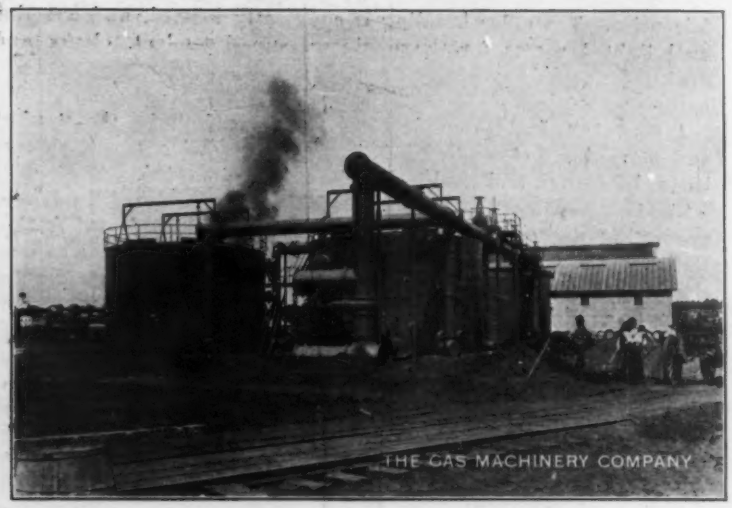


Fig. 11.—Oxide Purifiers.

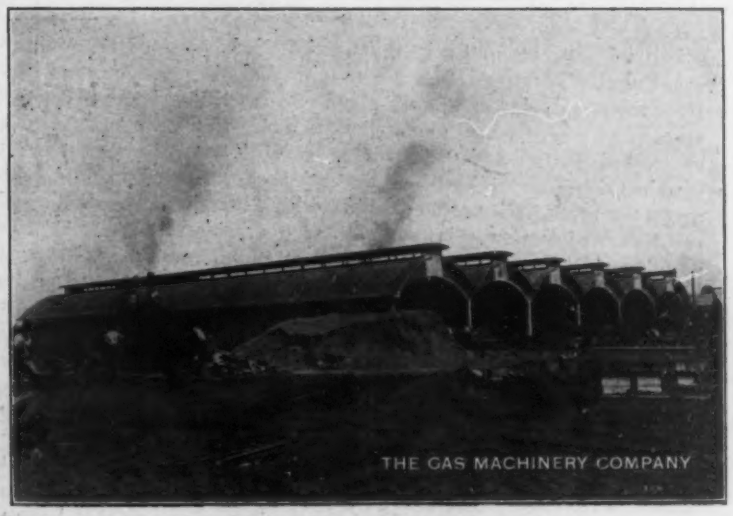


Fig. 12.—Shed for Carbon Briquettes.

of the pump house presented interesting problems, as the subsoil near the river was not considered suitable for carrying a very heavy load and the variation of water level in the river is over 30 feet. The pumphouse is built of reinforced concrete and brick, is water proof, and of handsome appearance.

The present oil storage tank has a diameter of 90 feet and can contain approximately 40,000 barrels. An additional oil storage tank will be brought over from the old plant in the near future.

A large amount of lampblack is necessarily produced when making gas economically from crude oil, which lampblack is carefully separated by filters, and then briquetted into a merchantable fuel, the demand for which is steadily increasing. These carbon briquettes are a valuable byproduct, since they can be used for many purposes, are clean to handle, are practically pure carbon, and can be sold at a

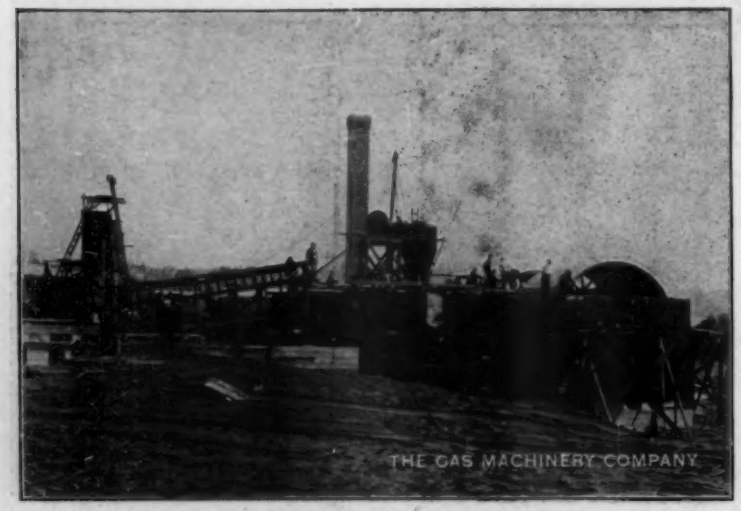


Fig. 13.—Briquetting Plant in Course of Construction.

fair price. The office building is conviently located, and contains well lighted rooms for the engineer, superintendent, clerks and draftsmen, as well as a fully equipped laboratory, sleepingrooms and bathrooms.

A part of the boiler room has been partitioned off for the comfort and convenience of the Company's employees, and complete shower baths, lavatories, and steel lockers have been provided.

The Gas Machinery Company, Cleveland, O., furnished the oil gas generating and purifying apparatus; Messrs. R. D. Wood & Co., Philadelphia, built the holders; the electrical machinery was purchased from the General Electric Co.; and the gas compressors are of the Laidlaw-Dunn-Gordon type.

The whole installation of the plant, which is now in successful operation, was made under the direct supervision of Mr. Hilmar Papst, General Manager, and Engineer E. L. Hall. Mr. D. K. Crighton represented The Gas Machinery Company during the erection of the work.

Handling, Storing and Sale of Coke.[1]

[Prepared for Eighth Meeting, American Gas Institute, by Mr. J. W. Shaeffer.]

It is unfortunate that coke must be handled, more so that it must occasionally be stored, for the reason that its physical character, from the standpoint of handling in bulk, resembles a cross between an egg, an emery wheel and a sponge. This imaginary material may be treated as two-ended, requiring careful handling, since, unless care be taken, one end will break and the other will rapidly grind away the property investments with which it comes in contact. Both results are of economic importance, as low price attends small size, and depreciated apparatus must be renewed. These properties cause vexation in handling and storing operations. Whether the selling process proves so depends largely if there is anything left suitable for sale after the coke has been mishandled or stored. The egg characteristic is present in all coke, and, although generally understood, it is not so generally appreciated; accordingly crimes are committed in its handling, the grossness of which is only surpassed by the man who sells the product resulting from such offenses.

The foregoing is intended to emphasize that coke is difficult to handle, and that, unless well-handled and intelligently sold, the extension of its sphere of use and the widening of its market become serious problems.

The great movement towards coal gas manufacture is making available for sale a constantly and rapidly increasing tonnage of coke, the disposition of which depends not so largely upon the existence of a demand as upon good quality and live, honest, intelligent salesmanship.

The producer first handles, then sells; the consumer first buys, then handles, the point of contact between producer and consumer being the salesman. Poor quality and handling are instantly detected by the user. New patrons are always skeptical and not infrequently critical on initial shipments. Their long acquaintance with other fuels has caused them to be prejudiced in their favor. The householder compares domestic coke with anthracite; the metallurgist measures by-product against beehive coke. The considerations in this paper do not apply to beehive coke except where direct reference is made to it.

Successful coke marketing is contingent upon carrying out the following programme:

1st. Chemical analysis of coke must be such as to suit it to the purpose intended.
2nd. Physical structure must fulfil requirements.
3rd. The coke should be bright and silvery.
4th. It must be dry as possible.
5th. It must be properly handled.
6th. It must be uniformly of the proper size for the purpose intended.
7th. It must be delivered in packages acceptable to the trade.
8th. An economic advantage in its use must be demonstrated.
9th. Contact between producer and consumer through the salesman must be positive at all times.

If painstaking and intelligent rendition of this programme fails to develop and hold a coke market, the case must be considered hopeless.

Analysis and Structure.—In taking up the nine numbers on the programme the first two can be passed over, as they do not properly come within the province of this paper.

Luster and Moisture.—Consideration of the third and fourth features may be combined, as the production of silvery and dry coke is accomplished in the operation of quenching.

While silvery coke is made in the quenching the very best quenching practice fails to brighten a spongy, green coke.

Quenching methods in different plants are widely at variance, the whole question is still a mooted one, and the majority of systems do not produce the best results possible.

Silvery appearance adds no intrinsic value, but it assists in dispelling the prejudice of the novice to its use, whether he be a consumer of domestic or metallurgical coke. The former probably has in mind the luster of anthracite to which he is accustomed; the latter, the characteristic beehive silver, so a bright, lustrous coke has decided ethical effect upon the customer.

If coke is of right quality the silvery appearance will result from prompt and proper quenching. In asmuch as no coke is very bright which has been overquenched, it is conversely true that coke is dry when it is silvery. While this deduction may not hold true under all conditions of manufacture and handling, it is accurate enough to be of value in the inspection of masses of coke.

Immediately coke is removed from the coking chamber combustion begins and is rapid enough to affect its general appearance in a short time. Delays of minutes, even seconds, in quenching mark the distinction between the best and only ordinary results. No coke is very bright that has been drenched instead of quenched; and no coke which has been drenched is acceptable to the user, for the reason that the sponge characteristic makes it tenacious of water, thus if dry coke is to be marketed it must be so made at the time of quenching. This implies that sufficient water should be applied to effectually arrest combustion, and no more.

To ideally arrest combustion in a piece of coke it is necessary to apply only as much water as the heat of the coke can vaporize. Therefore, if an exact heat balance could be effected, the coke would be perfectly quenched, no excess moisture being present after cooling to atmospheric conditions. Even though it were possible to determine the quantity of water theoretically required, operations in practice could not be conducted with a sufficient degree of nicety to achieve the desired results on account of the following variables:

a. In quantity of coke presented for quenching.
b. In temperature.
c. In size of individual pieces forming the general coke mass.
d. In the distribution of the mass.
e. In temperature of water applied.
f. In quantity of water applied.
g. In atmospheric conditions.

It might seem unwarranted refinement to give serious consideration to these features in practical operations, but it is clear that perfect quenching is impossible if these variables are not eliminated or compensated.

A variable quantity of coke presented for quenching reflects the character of the manufacturing operations, and can be improved by paying attention to the coal charges.

1. Slightly abridged.—Eds.

Variable coke temperatures also result from manufacturing irregularities.

The militating effect of the third variable is of great importance, as it is impossible to eliminate or exercise a reasonable control over it. Coke as presented for quenching varies in size from large lumps to particles of dust. After quenching a mass of coke the largest pieces show the lowest moistures, because the larger the piece the greater the ratio between superficial area and volume. The best, therefore, that can be expected is to so adjust that the moisture in the average sample be as low as possible.

It is possible to exercise fairly good control over distribution of the mass, and it is essential the distribution of hot coke be as uniform as possible, no matter how the water is applied, for no water nozzle or spray pipe should be expected to quench alike the coke on areas of differing depths.

Changes in temperature of water applied have a very trifling effect on everyday results. Following even distribution of the coke, there should be intelligent application of water in proper quantity, or an even distribution of a definite quantity of water in a definite time over a definite quantity of coke. Where quenched by a spray from holes drilled in a pipe, constant attention is required to ensure that none of the holes become clogged, thereby impairing the efficiency of the scheme. Frequently the spray holes are so small that impingement of water upon coke has no effect in dislodging clinging breeze; also, penetration through the bed is very slow, due to rapid vaporization on top of coke mass, and the top of the coke is usually over quenched. While slow quenching is probably most common to spray systems, it is not infrequently a source of trouble in otherwise efficient methods. That there may be regularity in the use of water it is essential that the pressure be constant. All quenching arrangements should be such as to enable the ordinary operator to control the water with a knowledge of relative quantities applied under varying conditions.

No attempt to specialize upon the influence of atmospheric conditions will be made. In large operations in northern climates, where much work is done outdoors, difficulties are experienced in extremely low temperatures, due to uncertainties inherent in all manufacturing plants. Quenching practice in retort house and by-product oven operations varies so widely, that investigation in detail of this branch of coke handling might well be undertaken in a paper by itself.

Great virtues are ascribed to the different quenching systems. In deciding the question on its merits, that method should be adopted in which it is possible to hold the greatest number of conditions uniform and constant.

A brief description of the Milwaukee quenching method, and a statement of the results, are here submitted, as they illustrate most of the foregoing in relation to quenching in general.

The plant produces 1,800 tons of coke daily in by-product ovens having a capacity of 7½ tons per oven. The uses are general, serving metallurgical, general manufacturing and domestic purposes in a wide territory. Moisture complaints are so rare that the quenching operations are not given any attention, except to insist that the work be done in accordance with the established rules.

The coke from each oven is discharged into a self-propelled 40 foot car having a sloping bottom. Good distribution of the coke mass over the car bottom is attained by slowly moving the car under the issuing coke. The first coke coming out is landed in one end of the car, the movement of the latter being so gauged that the last of the charge just fills the opposite end, with an even depth between.

If the speed of the issuing coke changes without a corresponding change in car speed, the best results are defeated. Variations in car speed, resulting from fluctuations in line voltage, are minimized by the skill with which the motor men operate the cars. It is evident that perfect distribution by this method is not possible; but very good work can be done in connection with a water supply of unvarying pressure.

Fig. 1 illustrates the application of water at a rate of 2,000 gallons in 1 minute, 50 seconds, the actual time required for quenching. Twenty feet above the nozzle is a constant level tank, for quenching purposes. The car is given two passes under the fan-shaped stream which cuts it transversely. Most of the water is wasted, in the sense that it is not vaporized or raised much in temperature, the idea in applying so heavy a stream being to ensure that the entire mass be uniformly treated in minimum of time, during which there can be no deep penetration, or heavy absorption of water in the larger sizes, the heat in the interior of the large lumps having been dissipated in the vaporization of the skin water and by radiation to the atmosphere. The greater superficial area, per unit of volume in the smaller lumps, results in a greater radiation loss per unit of volume, which, together with the larger quantity of skin water held, causes an excess of moisture to remain when thermal equilibrium with the atmosphere is reached. The following table is regular Milwaukee practice:

Fig. 1.

Grade.	Size.	Moisture, Per Cent.
Foundry	Over finger bars 1¼″ average width of space	0.98
Furnace	Through crusher rolls 3¼″ space between rolls	1.4
Furnace	On screen with 1¼″ square perforation	1.4
Egg	Through crusher rolls spaced 2″ apart, or through finger bars 1¼″ average width of space	3.1
Egg	On screen with 1⅞″ square perforations	3.1
Range	Through 1½″ perforations	6.1
Range	On screen with 1⅜″ perforations	6.1
Chestnut	Through 1⅛″ perforations	8.3
Chestnut	On screen with 1⅛″ perforations	8.3
Pea	Through ¾″ perforations	9.2
Pea	On screen with ⅝″ perforations	9.2
Breeze	Through ½″ perforations	12.8
Run of oven	All	4.6

Proper Handling and Size.—In passing from quenching to the subsequent handling operations, the fragile property of the coke must be carefully reckoned with. In supplying a general coke market the product does not carry the proper percentages of natural sizes to balance the market requirements, so crushing must be resorted to. This is truer of by-products than of retort coke, which seldom requires crushing, even for domestic purposes, as breakage in handling and screening reduce the large size to suitable dimensions. A well designed plant should handle coke with minimum breakage; and, when crushing is necessary, the object of a good design is defeated, for, in crushing, production of the desired size is always accompanied by smaller ones ranging down to breeze, the most bothersome and commercially least profitable coke product.

The main elements of handling plants are conveyors, crushers and screens; and the types of these to be employed depend upon local conditions. In Milwaukee belt conveyors, fluted roll crushers and rotary screens are used, and grizzly bars for the separation of foundry coke from the undersize. Belt conveyors have been severely criticised because of conveyor wear-and-tear, but not from the standpoint of coke breakage. The writer inclines strongly to belt conveyers, because of the delicacy with which they handle coke and the absence of intricate mechanical devices and moving parts under sliding friction.

The record of performance of 54 belts, on 9 Milwaukee conveyors, is as follows:

Number of Conveyors	Number of Belts Installed.	Width of belt in Inches, Total.	Length of Belt in Feet Total.	Speed Feet per Minute, Total.	Number Days in Use, Total.	Tons Handled, Total.	Day Tons.
9	54	1,580	11,309	21,060	13,474	4,805,919	.....
		Average.	Average.	Average.	Average.	Average.	Average.
.. ....	1	29.2	209.4	390	249	88,999	22,205,125
.. ..		29.2	1	390	249	426	106,041

An arrangement to avoid excessive wear on the botton of chutes delivering coke from one conveyor to another, is shown in Fig. 2.

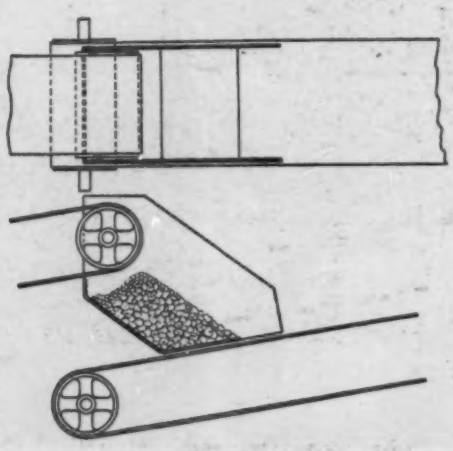


Fig. 2.

The chute bottom is in the form of a pocket, which fills with coke until the angle of repose is reached, after which coke slides upon coke.

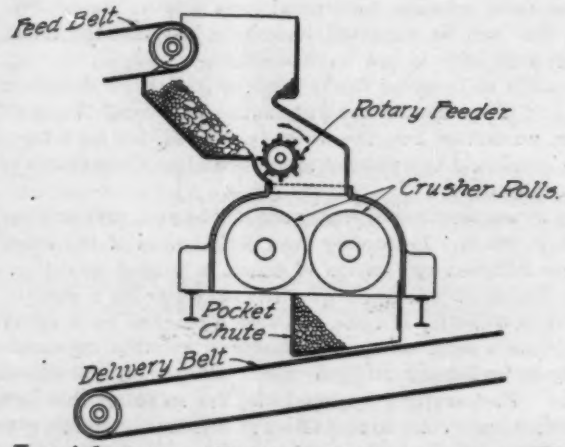
Fig. 3 is a table showing, for regular sizes, angles of repose and angles of slide of coke upon coke, the angles decreasing with the coke size.

Angles of Repose and Slide of Coke upon Coke.

	Test	1	2	3	4	5	6	7	8	9	10	Avg.	Moisture
Foundry Regular	Repose	44°	43°	44°	44°	45°	44°	44°	45°	44°	44°	437°	90
	Slide	47°	46°	46°	47°	46°	47°	46°	46°	46°	46°	462°	
Dry	Repose	44°	43°	43°	44°	44°	44°	44°	44°	44°	44°	438°	0
	Slide	47°	46°	46°	46°	46°	45°	46°	46°	46°	46°	460°	
Wet	Repose	43°	43°	43°	44°	44°	44°	44°	44°	44°	44°	437°	0.0
	Slide	46°	46°	47°	46°	46°	46°	46°	46°	46°	46°	461	
Blast Furnace Regular	Repose	45°	44°	45°	45°	44°	45°	45°	45°	46°	45°	445°	1.4
	Slide	48°	47°	46°	47°	47°	47°	47°	47°	46°	47°	469°	
Dry	Repose	45°	46°	44°	43°	44°	44°	45°	44°	44°	44°	443°	0
	Slide	47°	48°	46°	47°	46°	47°	47°	47°	47°	47°	469°	
Wet	Repose	42°	43°	43°	42°	44°	43°	43°	43°	43°	44°	430°	0 to 100
	Slide	45°	46°	45°	47°	46°	46°	46°	46°	46°	46°	450°	
Egg Regular	Repose	39°	40°	39°	40°	40°	39°	40°	40°	40°	40°	397°	3.1
	Slide	42°	43°	42°	42°	42°	42°	42°	42°	42°	42°	421	
Dry	Repose	39°	41°	40°	40°	40°	39°	40°	40°	40°	40°	399°	0
	Slide	42°	42°	43°	42°	42°	43°	42°	42°	42°	42°	422°	
Wet	Repose	41°	40°	39°	40°	41°	41°	40°	41°	41°	41°	405°	0 to 100
	Slide	43°	42°	43°	43°	42°	43°	42°	43°	43°	43°	427	
Range Regular	Repose	41°	39°	40°	41°	39°	39°	41°	40°	38°	38°	396°	0.1
	Slide	44°	43°	44°	42°	43°	44°	44°	44°	44°	44°	436°	
Dry	Repose	41°	39°	39°	40°	41°	40°	39°	39°	39°	39°	396°	0
	Slide	44°	43°	44°	43°	44°	44°	44°	43°	44°	44°	436°	
Wet	Repose	41°	40°	41°	39°	40°	41°	41°	41°	41°	41°	406°	0 to 100
	Slide	43°	44°	43°	44°	44°	43°	43°	43°	43°	43°	434°	
Chestnut Regular	Repose	40°	41°	40°	40°	41°	40°	39°	40°	40°	40°	393°	0.3
	Slide	41°	42°	42°	41°	42°	42°	42°	42°	42°	42°	410°	
Dry	Repose	40°	39°	39°	40°	40°	40°	39°	40°	40°	40°	397°	0
	Slide	42°	41°	42°	41°	42°	42°	42°	42°	42°	42°	418°	
Wet	Repose	40°	39°	40°	40°	40°	40°	40°	39°	40°	40°	390°	2 to 10
	Slide	41°	42°	41°	41°	42°	41	42°	41°	41°	41°	413	
Pea Regular	Repose	39°	39°	38°	39°	38°	40°	39°	39°	39°	39°	390°	9.2
	Slide	42°	41°	41°	42°	41°	41°	41°	40°	41°	41°	411°	
Dry	Repose	39°	40°	39°	38°	39°	39°	39°	39°	39°	39°	390°	0
	Slide	42°	42°	41°	41°	41°	42°	41°	41°	41°	41°	413	
Wet	Repose	38°	39°	40°	39°	40°	40°	40°	40°	40°	40°	396°	10 to 12.0
	Slide	42°	42°	41°	42°	41°	42°	42°	42°	42°	42°	416°	
Breeze Regular	Repose	36°	37°	38°	37°	36°	37°	37°	37°	37°	36°	360°	12.0
	Slide	42°	42°	41°	42°	42°	42°	41°	42°	42°	42°	410°	
Dry	Repose	37°	38°	36°	38°	37°	37°	37°	37°	36°	38°	371°	0
	Slide	41°	42°	42°	41°	42°	41°	41°	42°	42°	42°	416°	
Wet	Repose	39°	40°	39°	41°	40°	40°	40°	40°	40°	40°	399°	12 to 150
	Slide	43°	42°	43°	43°	42	43°	43°	43°	43°	44°	433°	

Fig. 3.

The benefits of rotary feeders (Fig. 4) to guard against periodic over-loading of conveyors, etc., can hardly be overestimated; as, without proper feeders, it is difficult to avoid fluctuations in feeds from no load to overload. No belt, crusher or screen should be expected to produce best results under uneven conditions of feeding, except where size of equipment is far in excess of requirements.



Typical Arrangement Two Roll Crusher With Rotary Feeder Fig 4

There is no crusher better adapted to coke work than the fluted roll type, and it should be so arranged that the distance between rolls can be quickly adjusted throughout a considerable range, and that all adjustments are positively fixed.

Experience with 2-roll crushers, having 1 roll backed up by springs to afford relief in cases of overload, has condemned this type except, perhaps, when a feeder is superimposed. One reason for equipping crushers with springs is to protect the machinery from damage if hard substances like iron pass between the rolls. In order that protection be ample, the springs are usually so light that movement of the axis of the roll is observed under almost all conditions of feeding, and this makes it necessary to have the roll spacing less than would be required if both rolls were held against spreading.

The action of a crusher, with backing up springs under light loads, is to crush a great many pieces already undersize, and under heavy (or over) loads, the spreading of the rolls permits much coke to pass larger than the size desired. Where crushers are fed by conveyors, usually the length of rolls is considerably greater than the width of coke stream, and so the coke, instead of being spread over the entire length of the rolls, is concentrated over ⅓ to ½ in the center. In short time the rolls show a reduction in diameter within the feeding zone, and, if not corrected, proper crushing cannot be obtained, even with the rolls touching on the unworn ends. A decided improvement in the control of maximum size, a lesser production of "fines," lower power consumption, reduction in upkeep cost and a large increase in effective capacity have accrued from the use of crushers with rolls rigidly held and evenly fed by rotary cast iron feeders above the crushers. (Fig. 4.)

The hopper above the feed roll of fairly large capacity, serves as a reservoir, in which irregular feeding is absorbed. It is well to have an individual variable speed drive for the feed roll, so that the rate of crushing may be varied to suit requirements. The crusher rolls are separated about 3¼ inches for furnace and about 2 inches for domestic coke. With a rotary feeder the rolls wear evenly throughout their length and their life is appreciably prolonged. Numerous difficulties attend coke screening and the relation between size and moisture (as earlier mentioned) is of great importance, particularly where all commercial sizes are prepared. Superior screening does not consist in merely effecting a thorough segregation of sizes, but implies that clinging breeze be removed. The percentage of breeze clinging to a unit weight of coke is a function of size of pieces and of the moisture present in breeze and coke. The results of determinations in this regard are shown in Fig. 5.

Foundry coke, carrying less moisture and exposing less surface than an equal weight of domestic coke, will less tenaciously hold less breeze, so it is good practice to screen foundry coke over grizzly or finger bars, or even stationary perforated plates. It is seriously regrettable that finger bars cannot be used in preparing domestic sizes, as their wear-and-tear is negligible compared with that of steel plates.

Blast furnace managers differ greatly as to maximum and total

Determination of Breeze Clinging to Coke.

Grade			Moisture	% of Breeze by Weight Clinging to Coke.	Grade			Moisture	% of Breeze by Weight Clinging to Coke.
Foundry	Test 1	Coke	0.90	1.55	Range	Test 1	Coke	6.10	2.00
		Breeze	12.50				Breeze	12.50	
	Test 2	Coke	5.00	4.10		Test 2	Coke	6.10	8.40
		Breeze	12.50				Breeze	12.50	
	Test 3	Coke	6.00	6.00		Test 3	Coke	6.10	6.30
		Breeze	17.00				Breeze	17.00	
	Test 4	Coke	0.00	.55		Test 4	Coke	0.00	1.36
		Breeze	17.00				Breeze	17.00	
Blast Furnace	Test 5	Coke	1.30	1.07	Chestnut	Test 1	Coke	6.30	3.00
		Breeze	12.50				Breeze	12.50	
	Test 6	Coke	9.30	5.02		Test 2	Coke	10.00	10.40
		Breeze	12.50				Breeze	12.50	
	Test 7	Coke	9.30	6.10		Test 3	Coke	10.00	6.90
		Breeze	17.00				Breeze	17.00	
	Test 8	Coke	0.00	64		Test 4	Coke	0.00	1.41
		Breeze	17.00				Breeze	17.00	
Egg	Test 1	Coke	3.10	1.08	Pea	Test 1	Coke	9.20	5.40
		Breeze	12.50				Breeze	12.50	
	Test 2	Coke	9.20	6.70		Test 2	Coke	10.10	12.90
		Breeze	12.50				Breeze	12.50	
	Test 3	Coke	9.20	7.90		Test 3	Coke	10.10	10.10
		Breeze	17.00				Breeze	17.00	
	Test 4	Coke	0.00	1.20		Test 4	Coke	0.00	4.60
		Breeze	17.00				Breeze	17.00	

range of size which should be charged into a furnace, but they agree that breeze should not be included. Frequently breeze only is removed from run-of-oven coke for furnace work, and the average size is, therefore, considerably smaller than the average of foundry coke, resulting in greater difficulty in cleaning, so that it is doubtful whether bars are sufficiently effective, especially where quenching work is not the best.

The higher moistures present in domestic coke, preclude the possibility of properly screening it without mechanical agitation, the degree of violence required depending upon the size and, impliedly, upon the percentage of water present. Domestic coke, in dry cellar for a long time, may lose sufficient water to effect a loss of grip between small breeze and the larger particles, or this may occur in box car shipments to distant points in warm weather. Both conditions raise complaints hard to reconcile with the operating records, but generally they can be traced to moistures higher than usual at time of screening. If coke and breeze were dry when screened, the clinging of the latter would cause little trouble. In practice moistures must always be reckoned with, and no screening arrangement for domestic coke is complete that does not subject it to considerable jar.

The cost of upkeep on rotary screens of large size is considerable, due to the abrasive action of the coke on screen plates, and fine coke particles settling upon all moving parts also do much damage.

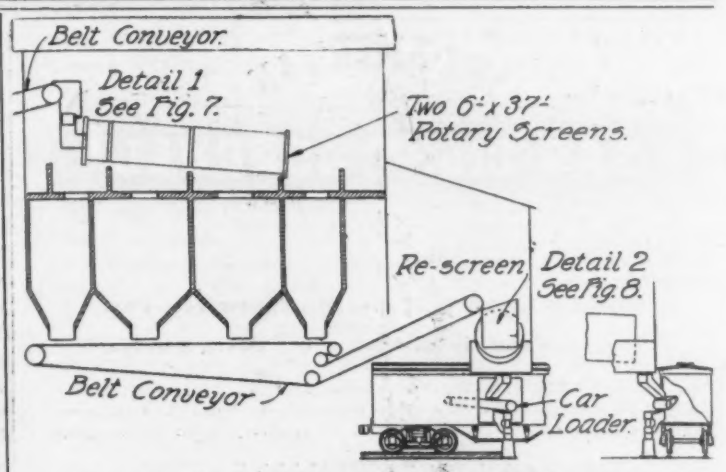
Manganese steel, for this class of service, has much longer life than carbon steel, but as all finished surfaces must be ground, with comparatively few concerns who specialize in this class of work, its use should only be undertaken in plants having a skilled mechanical force.

Flat shaking screens, usually inclined at a slight degree from the horizontal, are on the market in variety of design, but these generally do not rattle the coke sufficiently to be satisfactory. In some the design and construction are so crude that it is almost impossible to provide a structure rigid enough to withstand the effect of unbalanced action. Great success is reported in Europe of a flat shaking-screen, the 4 corners supported by ball bearings, the screen movement being obtained from the throw of a crank or eccentric attachment to the screen frame through flexible wire ropes. Objectionable vibration in the supporting structure is eliminated by mounting 3 or 4 screens one over the other and setting the cranks at 120° or 90°.

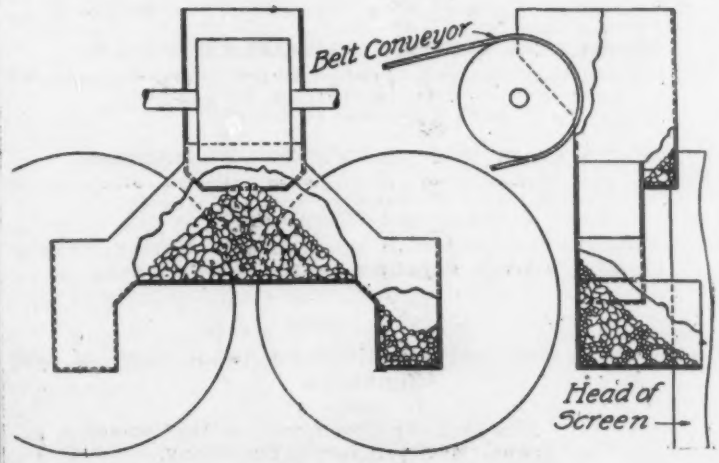
In another unique design the screen frame is suspended on wire ropes attached to each corner. Movement is by vertical shaft, passing through a bearing, mounted rigidly to the screen frame, which takes an eccentric motion from the unbalanced flywheel keyed to the shaft. Upon the side of the flywheel is a movable weight, its position and the speed determining the amplitude of vibration of the screen. The driving and driven sections of the vertical shaft are connected by a piece of flat spring steel.

Fig. 6 shows a portion of the Milwaukee domestic coke handling plant, the pocket construction of chutes and hoppers, and the facilities for loading into box cars. Fig. 7 is a detail at the head of two rotary screens, and illustrates the pocket principle.

A belt conveyor (shown in Fig. 6) conveys coke from receiving bins under the rotary screens to the loader, through a re-screen for the removal of fines which always form in the bins. The re-screen



General Arrangement Domestic Screening And Box Car Loading Plant. Fig. 6.



Detail 1 Fig. 6. Fig. 7.

serves as a final check upon the entire operation, and is an indispensable adjunct.

Fig. 8 shows the re-screen in detail.

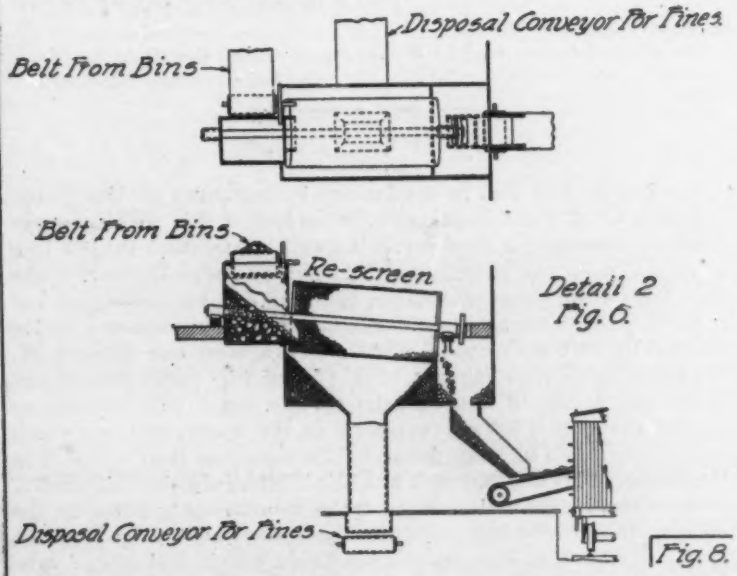


Fig. 8.

Figs. 9 and 10 are photographs of the first Ticknor-Manierre type of box-car loader in service 4 years. It has demonstrated that for loading domestic coke it deserves attention. The operation demands that attendant stay in car until both ends are filled, so, where hot coke is loaded, the atmosphere within the car is frequently too warm for comfort. Occasionally in the loading of foundry coke, the temperatures are not too high for the operation of this type of loader.

Figs. 11 and 12 are views of an electric box car tipple, used in Mil-

(*Continued on page 42.*)

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NOTICE TO ADVERTISERS.

New Advertisements and changes of copy therefor should be in hand Wednesday noon of week prior to date of issue.

NEW YORK, MONDAY, JANUARY 19, 1914.

[Official Notice.]

Forty-fourth Meeting, New England Association of Gas Engineers.

New England Association of Gas Engineers,
Office of the Secretary,
East Boston, Mass., Jan. 6, 1914.

To the Members, New England Association of Gas Engineers: The Fourty-Fourth Annual Meeting, New England Association of Gas Engineers, will be held, Wednesday and Thursday, February 18 and 19, 1914, at Young's Hotel, Boston.

Papers on timely topics of interest are being prepared.

Applications for Membership should be sent to the Secretary before February 17th. "Questions" should be sent early so they may receive ample consideration.

The annual dinner will be Wednesday evening the 18th.

N. W. Gifford, Secretary.

BRIEFLY TOLD.

Gas Ranges May Not be Sold under Foreclosure of Mortgage.—A decision of much importance, in respect of that which may be lawfully considered a fixed part of a dwelling structure subject to a mortgage sale, was recently handed down by Judge Warner, of the New York State Court of Appeals, speaking for his colleagues and himself. The case was originally brought in the lower court, by the Central Union Gas Company, of this city, against one Edward W. Browning, who, as mortgagee, bought in certain partly constructed apartment houses in East 37th street, June, 1910. Complainant alleged conversion of 109 gas ranges set in the apartments, but which had not been paid for, and demanded the ranges or their value from Browning. The original suit was tried before Justice O'Gorman, who ordered a dismissal of the case, the opinion being based on the holding that Browning, had purchased the ranges as part of the property, since the Company had not filed a conditional bill of sale. Judge Warner, in submitting the decision of the Court of Appeals, writes: "* * * The ranges were not so attached to the building that, as a matter of law, they became part of it. They were connected by the usual service gas pipe and stovepipe flue, one of which could be severed by simply unscrewing a coupling, the other by lifting it out of the aperture made for it. This is not such an attachment to the building as would give a mortgagee any right of ownership as against the mortgagor, and we do not see how a purchaser at a foreclosure sale could acquire any greater right. The decision of Justice O'Gorman is reversed and a new trial ordered."

December Meeting, Illuminating Engineering Society, New York Section.—The December meeting of the named body was held the evening of the 8th inst. in the building of the Engineering Societies. After a goodly number of the members had dined at Keene's Chop House, Mr. W. Cullen Morris assumed the Chair, and Mr. A. L. Powell read a paper on "The Lighting of a Home by Electricity." In this the author described in detail the lighting of the average home, showing what can be accomplished at a normal cost to make the lighting more attractive and pleasing. The paper was well accentuated by lantern slides showing the old and new equipments. Mr. Thomas Scofield then read his paper on "Lighting the Home by Gas," describing the lighting insta llations in the "model apartment" maintained by the Consolida ted Gas Company in the 42d street Building, New York city. This paper, too, was illustrated with lantern slides showing an apartment efficiently and artistically lighted by gas, the lighting and extinguishing being controlled by automatic, distant-controls for each room. Both papers were very interesting, and brought out lively discussion. In this connection the Journal strongly urges that more practical attention of this sort be given this subject so that more data can be secured respecting better illumination for the homes on gas use account. The February meeting will be a joint-assembling with the Municipal Art Society, when Mr. C. F. La Combe is carded to speak on "Street Lighting Abroad."

A Pleasant Occasion.—The Educational Committees and the Heads of Departments of the Jersey City Office, the Public Service Gas Company, and the Public Service Electric Company on Tuesday evening, the 8th inst., gathered around an inviting and bountifully prepared table set in the Central Hotel, Hoboken, N. J., and did justice to a planked steak dinner. This satisfactorily disposed of an adjournment to the theatre was ordered, where all cares and trials were forgotten in the merriment caused by the occupants of the stage. Among st those present were Messrs. E. G. Kent, E. V. Walsh, G. L. White, C. S. Buller, Fred. Luhne, D. B. Benedict, E. Mercer, Adolph N. Berg, A. B. Spaulding, W. H. Waterbury, T. B. Barclay, H. W. Holmes, Fred. Kuhlman, Frank Dappisch, C. K. Meyers, L. H. Frank, J. M. Rosa, G. E. Smith, and E. J. Jacobson. All enjoyed a pleasant and social time. A "get together" occasionally (aside from business) provides an opportunity to meet the other fellow as he really is.

Progress Club, B. U. G.—The January meeting of the Progress Club, Brooklyn Union Gas Company, was held in the rooms of the Y. M. C. A. building, Fulton and Bond streets, the evening of Wednesday last. The lectures presented were by Mr. J. T. White and Mr. A. F. Murphy on "Gas Main Extensions," and by Mr. E. D. Jones, on "The Construction of a 42-Inch Line." Mr. R. C. Kellogg spoke on "Emergency Service and the Pulmotor;" and Dr. G. J. Mahr demonstrated the instrument. A pleasing entertainment was given by professional talent, and the Royal Marine Band furnished the music.

Engineers, New York Public Service Commissioners.—It is generally well-known that the Public Service Commissioners of this State are clothed with heavier responsibilities, through greater controls over its municipal and railways utilities, than are those of any other State, unless it be in the instance of the Inter-State Commerce Commission. Originally, on the appointment of New York Commissioners, Governor Hughes appointed Mr. James E. Sague (late Vice President the American Locomotive Company) to the Second District Commission, the appointee being a well-qualified engineer. In filling subsequent vacancies, however, no other engineer was selected for either District; and many have alleged that this failure or happening was owing to the fact that the appointments at the respective hands of Governor Dix and Governor Sulzer were dictated by political exigencies or considerations. Considering the importance of this inaction or failure a Committee, appointed by the American Institute of Consulting Engineers, visited Governor Glynn to put properly before the chief executive the good public policy of seeing to it that the engineering profession was recognized in the selecting of men to fill future vacancies on the Boards. This action would certainly serve the public interest and safeguard the positions of the industries affected; for, while as often-times urged, the Commissioners can employ engineers as subordinates, it is nevertheless a fact that the class of engineers desired cannot always be commanded offhand. Further, the honor of serving on such a body

would be likely a greater incentive to attract men of the caliber required, rather than the salary going with the post, even though such salary did go into five figures.

PENNSYLVANIA UTILITIES UNDER COMMISSION.—A correspondent incloses this: The Public Utilities Act, legally known as the Public Service Company law, passed by the last Pennsylvania legislature, came into full effect with the new year. Commissioners, who were appointed several months ago, have been busy organizing for the work of enforcing the law, and it was expected the Commission would have completed its organization at its meeting, on January 6. The law does not apply to a producer of electricity, gas, power, steam heat or water for his sole use or for the use of his tenants only, and it is also restricted as to its jurisdiction over municipalities. An important provision regarding its application to municipalities is that no municipality may acquire, construct or begin to operate any plant for serving the public when a company for the same purpose is already serving, without the approval of the Commission. The Commission is given power to supervise and regulate the adequacy and safety of the plant of a company, and also the service rendered by it. When the Commission, after a public hearing and upon notice to the company, shall determine that its services or facilities are inadequate or unsafe, it shall specify what is adequate, safe and reasonable, and with such specifications the company must comply. The act provides that a company must furnish its service at reasonable rates and in conformity with the reasonable orders of the Commission. When the Commission has determined the fair rate, and a rate has been collected after January 1, 1914, which is found to be unjust, unreasonable or discriminatory, or is in violation of the orders of the Commission, then, when damages have been actually sustained by the customer, and upon his petition, the Commission shall determine the amount of such damages and issue what is called an "order for reparation." If the company does not pay them within the time limited by the order of the Commission, the customer to whom the damages have been awarded may sue therefor in any court of common pleas. The order made by the Commission shall be regarded as *prima facie* evidence of the facts stated in the order, and that the petitioner is justly entitled to the amount claimed. This means that the burden of the proof is upon the company to prove that the order is unjust, or the amount directed to be paid is unreasonable. A company may require the payment of rates in advance, or the making of reasonable minimum payments and deposits to secure future payments, and it may allow discounts for prompt payment, or impose penalties for failure to pay promptly, provided that all of these are reasonable and apply without discrimination to all customers under like conditions and similar circumstances. It is declared to be unlawful for a company to capitalize its franchise rights or powers in excess of the amount it has paid the common wealth or any municipality as the consideration for the grant thereof. When water, gas or electricity is served by meter the company is required to have proper and approved apparatus to test and prove its accuracy, to be proved from time to time and marked by the Commission. Whenever a consumer makes a written request for a test of a meter it shall be had in his presence if he desires. If the meter is found to be accurate within the Commission's rules, a reasonable fee to cover the cost of the test, to be fixed by the Commission, shall be paid by the consumer, otherwise it shall be borne by the company.

CURRENT MENTION.—

THE programme of the Philadelphia Section, Illuminating Engineering Society, which meeting was set for last Friday, included these numbers: "Deficiencies of the Method of Flicker for the Photometry of Different Colors," by Prof. C. E. Ferree; and on "A Reflecting Marker for all Books," by Dr. J. N. Rhoades. There was every promise of a particularly interesting session, and the assurance was positive that the attendance would be large. According to recent prevailing custom the meeting was to have been preceded by a dinner, at 6:30 P.M., to be served in the premises of the Engineers' Club, in which place the meeting proper was to be held.

THE Gas Machinery Company, Cleveland, O., has been awarded contracts for coal gas benches with sectional silica retorts and settings to be erected in these works: La Salle, Ills.; Benton Harbor, Mich.; Wausau, Wis.; Asheville, N. C. The installation at Benton Harbor is a duplicate of the inclined silica sectional retorts and settings installed by The Gas Machinery Company last year.

MR. M. WEBB OFFUT has been appointed General Manager, the Porto Rico Gas Company, with headquarters in San Juan, Porto Rico.

THE next meeting of the New York Section, the Society of Chemical Industry, will be held in Rumford Hall, 50 East 41st street, at 8:15, the evening of the 23d inst. The usual informal dinner (to be served, through the courtesy of the Chemist Club, in the dining hall of its premises, 52 East 41st, at 6:30, the evening named) will precede the session proper; and it is requested that those intending to partake will notify the Steward of such intention, by noon of the 22d. The programme is especially notable in that it lists the presentation of the Perkin Medal to John Wesley Hyatt. The prelude to the presentation will be made by Chairman G. W. Thompson, and the presentation speech proper will be made by Charles F. Chandler, Senior American Past President of the Society. Following the speech of acceptance by the recipient, will be an address by Frank Vanderpoole. Hon. Secy. Parker C. McIlhenney, in his notice respecting the occasion declares, "The presence of ladies is especially requested."

A RIGHT clever address was that made on the occasion of tha January meeting of the Gas Study Club, of the Wilmington (Del.) Gas Company, by Mr. H. S. Schutt. His theme was mainly concerned with the welfare of the body, for the advancement of which much has been done by him. Mr. W. A. Morris, New Business Manager of the Company, also spoke quite to the point on "The Commercial Use of Gas."

To conform to the necessary legal requirements, special meetings of the Boards of Directors of the several utilities corporations transacting business in Bay City and Saginaw, Mich., were recently held to ratify the election of Mr. A. D. Furlong to the position of Manager of the separate Company-members. Mr. John A. Cleveland was elected Vice-President.

MR. GEORGE M. PYNE, of Pennsgrove, has been elected General Superintendent, the New Jersey Gas Company, with headquarters in Glassboro, N. J.

"B. T. L." writing from Martinsburg, W. V., says: "I inclose you a line or two respecting a good time that was recently enjoyed by the employees of the local Gas Company. The happening was a supper, tendered to the employees of the office and shop, and nicely served in the cheerful home of Superintendent Leon H. Ware. The premises on South Raleigh street never held a heartier host or a happier lot of entertained, and I assure you the occasion was a memorable one. The guests included John Gregory, W. F. Fahoney, N. M. Conner, Wayne and Steven Thompson, B. W. Boone, G. L. Smith, C. H. Custer and Carl Riddlebenger."

THE heads of departments and office force of the employees of the Milwaukee Coke and Gas Company, at a banquet held in the Hotel Wisconsin, completed preparations for the issuance of a monthly periodical, to "Cement the different departments and improve interests among employees." The publication is to be of the order polyglot, in that it will carry columns containing matter printed in the English, German and Austrian languages. Of course, the reference to cement in the bond of union does not imply in any sense there is to be anything of a grouty nature in the publication.

THE gas plant at La Grange, Ga., will be in operation by the 15th prox.

DECLARING that a discrimination against other cities would be thereby established, the California State Railroad Commission has denied the application of the West Coast Gas Company for permission to raise its minimum charge per meter from 50 cents to $1, at Newport Beach during the winter. The Company's argument in support of the contention was that, while the 50-cent rate was reasonable during the summer season at the Beach, it was altogether too low when the Beach was not frequented.

THE New Hampshire Public Service Commission has, as the result of the recent series of hearings, ordered that the gas Companies of the State must submit to periodic testings of the gas supplied, in respect of purity, heating value and pressure; and to "Such other regulations as the Commission may from time-to-time prescribe." We have not received the full text of the dicision, but we know that, in respect of the heating value, the average B. T. U. per cubic foot of gas must be not less than 600, with an absolute minimum of 550. The Companies are ordered to install calorimetric outfits, and make tests three times each week, the records thereof to be always open to the public.

THAT "Little Grids" are here to stay seems more evident from day-to day happenings. Arrangements made by the proprietors of quite a large plant in the South, show the conversion to this system of two more boxes, making 6 in all that have been changed. We also know that that live Lone Star State member of the fraternity (Mr. W. I. Rathell, of Waco) is giving the grids a thorough tryout in his purifying plant.

(Continued from page 39.)

Fig. 9.—Domestic Coke Box Car Loader.

Fig. 11.—Box Car Tipple for Foundry Coke.

waukee, for loading foundry coke. As it is not necessary for operators to enter the car, coke can be loaded at rather high temperatures.

Fig. 13 illustrates dumping foundry coke from quenching cars onto grizzly bars, where it is screened, picked and inspected. The coke, dropping over ends of bars to a short conveyor, is carried into the center of the car, which, being inclined, causes it to slide toward the lower end.

Fig. 14 shows the bagging of domestic coke, the coke passing over screens immediately before bagging.

Storing.—This should be avoided, if possible. Production of fines, absorption of water, with consequent difficulty in re-screening, freezing in winter, less attractive appearance and high cost, are some of the chief disadvantages in storing coke, and yet the practice is often profitable.

Most coke is stored in summer and reclaimed during the winter when frost interferes with thorough cleaning, and although when frozen the presence of breeze is not easily noticeable, it becomes very prominent as soon as thawing takes place. Frequently, shipments

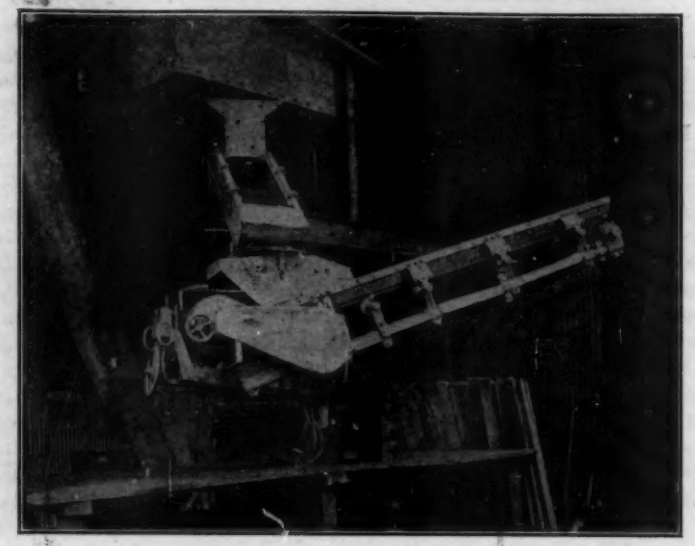


Fig. 10.—Domestic Coke Box Car Loader.

Fig. 12.—Box Car Tipple for Foundry Coke.

Fig. 13.—Foundry Coke Grizzly.

enroute are overtaken by mild weather, causing the coke to have a dirty appearance, resulting in vigorous complaints.

The hygroscopic property of coke is not fully understood. Quality

Fig. 14.—Bagging and Weighing Domestic Coke.

Angles of Repose and Slide of Coke on Smooth Concrete Slab.

	Test	1	2	3	4	5	6	7	8	9	10	Avg.	Moisture
Foundry Regular	Repose	20°	19°	20°	20°	20°	19°	20°	20°	19°	20°	197	90
	Slide	21°	20°	21°	21°	21°	20°	21°	21°	20°	21°	207	
Dry	Repose	19°	20°	19°	20°	20°	20°	20°	20°	19°	20°	197	0
	Slide	20°	21°	20°	21°	21°	21°	21°	21°	20°	21°	207	
Wet	Repose	20°	21°	21°	20°	21°	21°	21°	21°	21°	21°	206	0.0
	Slide	21°	22°	22°	21°	22°	22°	22°	22°	22°	22°	218	
Blast Furnace Regular	Repose	21°	22°	21°	20°	20°	20°	20°	21°	20°	20°	205	1.4
	Slide	22°	23°	22°	21°	21°	21°	21°	22°	21°	21°	216	
Dry	Repose	21°	20°	21°	21°	20°	20°	20°	20°	20°	20°	203	0
	Slide	22°	21°	22°	22°	21°	21°	21°	21°	21°	21°	213	
Wet	Repose	21°	20°	21°	21°	20°	21°	21°	21°	20°	21°	207	0 to 100
	Slide	22°	21°	22°	22°	21°	22°	22°	22°	21°	22°	217	
Egg Regular	Repose	20°	19°	20°	21°	20°	20°	20°	20°	20°	20°	200	3.1
	Slide	21°	20°	21°	22°	21°	21°	21°	21°	21°	21°	209	
Dry	Repose	20°	20°	21°	20°	21°	20°	20°	20°	20°	21°	203	0
	Slide	21°	21°	22°	21°	22°	21°	21°	21°	21°	22°	213	
Wet	Repose	20°	21°	21°	20°	21°	21°	21°	21°	21°	21°	206	0 to 100
	Slide	21°	22°	22°	21°	22°	22°	22°	22°	22°	22°	218	
Range Regular	Repose	23°	22°	22°	22°	22°	22°	22°	22°	22°	22°	221	0.3
	Slide	24°	23°	23°	23°	23°	23°	23°	23°	23°	23°	231	
Dry	Repose	22°	22°	23°	22°	22°	22°	23°	22°	22°	22°	222	0
	Slide	23°	23°	24°	23°	23°	23°	24°	23°	23°	23°	232	
Wet	Repose	20°	21°	21°	21°	20°	21°	21°	21°	21°	21°	206	0 to 100
	Slide	21°	22°	22°	22°	21°	22°	22°	22°	22°	22°	218	
Chestnut Regular	Repose	23°	22°	23°	23°	23°	23°	23°	23°	23°	23°	229	6.1
	Slide	24°	23°	24°	24°	24°	24°	24°	24°	24°	24°	239	
Dry	Repose	22°	23°	22°	23°	23°	23°	23°	23°	23°	23°	229	0
	Slide	23°	24°	23°	24°	24°	24°	24°	24°	24°	24°	250	
Wet	Repose	24°	23°	24°	24°	24°	24°	24°	24°	24°	24°	239	9 to 11
	Slide	25°	24°	25°	25°	25°	25°	25°	25°	25°	25°	249	
Pea Regular	Repose	30	31°	31°	30°	31°	31°	31°	31°	31°	31°	300	9.2
	Slide	31°	32°	32°	31°	32°	32°	32°	32°	32°	32°	310	
Dry	Repose	31°	30°	31°	30°	31°	31°	31°	31°	31°	31°	300	0
	Slide	32°	31°	32°	31°	32°	32°	32°	32°	32°	32°	318	
Wet	Repose	32°	31°	32°	32°	32°	32°	32°	32°	32°	32°	319	10 to 12.0
	Slide	33°	32°	33°	33°	33°	33°	33°	33°	33°	33°	329	
Breeze Regular	Repose	34°	35°	35°	34°	34°	34°	34°	34°	34°	34°	342	12.0
	Slide	35°	36°	36°	35°	35°	35°	35°	35°	35°	35°	352	
Dry	Repose	34°	33°	33°	33°	33°	33°	33°	33°	33°	33°	331	0
	Slide	35°	34°	34°	34°	34°	34°	34°	34°	34°	34°	341	
Wet	Repose	35°	36°	35°	36°	35°	35°	35°	35°	35°	35°	352	13 to 15.0
	Slide	36°	37°	36°	37°	36°	36°	36°	36°	36°	36°	362	

Fig. 15.

of coke undoubtedly exerts a great influence, and, because of variation, the determination of the quantity of water possible for coke to absorb from the atmosphere is difficult. Through the serious disadvantages of storing coke outdoors, those who do this regularly should estimate carefully the economic advantage of storing under roof. Foundry coke should not be stored at all, but if absolutely necessary proper protection must be provided.

From a metallurgical standpoint, increase in moisture incident to the storing of blast furnace coke is of no consequence, provided the breeze can be removed. When furnace coke is sold on a moisture guarantee, the latter is usually so low that allowances for excess water must always be made on coke from outdoor storage.

Angles of Repose and Slide of Coke on Steel Plate.

	Test	1	2	3	4	5	6	7	8	9	10	Avg.	Moisture
Foundry Regular	Repose	13°	13°	14½°	14°	13½°	14°	14°	13½°	14°	13½°	13.7°	90
	Slide	13½°	13½°	15°	14½°	14°	14½°	14½°	14°	14½°	14°	14.2°	
Dry	Repose	13°	13½°	14°	13½°	14°	14°	14°	14°	14°	14°	13.8°	0
	Slide	13½°	14°	14½°	14°	14½°	14½°	14½°	14½°	14½°	14½°	14.3°	
Wet	Repose	13½°	13°	13°	13°	13½°	13°	13°	13°	13½°	13°	13.1°	0.0
	Slide	14°	13½°	13½°	13½°	14°	13½°	13½°	13½°	14°	13½°	13.6°	
Blast Furnace Regular	Repose	14°	14°	14°	15°	14½°	14½°	14½°	14½°	14½°	14½°	14.4°	1.4
	Slide	14½°	14½°	14½°	16°	15°	15°	15°	15°	15°	15°	14.9°	
Dry	Repose	14°	13½°	14½°	14°	14°	14°	14°	14°	14°	14°	14.0°	0
	Slide	14½°	14°	15°	15°	15°	15°	15°	15°	15°	15°	14.0°	
Wet	Repose	13°	13½°	13°	13°	13°	13°	13½°	13°	13°	13½°	13.2°	0.6 to 1.0
	Slide	13½°	14°	13½°	13½°	13½°	13½°	13½°	13½°	13½°	14°	13.6°	
Egg Regular	Repose	19½°	17°	17°	17°	17°	16½°	16°	16½°	16½°	17°	17.2°	3.1
	Slide	21°	19°	18½°	19°	18½°	19°	16½°	17°	17°	17½°	18.5°	
Dry	Repose	15°	15½°	16½°	16½°	16½°	16°	16½°	16½°	16½°	16½°	16.2°	0
	Slide	16°	16°	17°	17°	17°	17°	17°	17°	17°	17°	16.9°	
Wet	Repose	13½°	14°	13½°	13°	14°	13½°	13½°	14°	13½°	13½°	13.6°	0 to 1.00
	Slide	14°	14½°	14°	13½°	14½°	14°	14°	14½°	14°	14°	14.1	
Range Regular	Repose	21°	19½°	19°	19½°	18½°	18°	18½°	17°	17°	17½°	18.2°	6.1
	Slide	22°	20½°	20°	20½°	19°	19°	19°	18°	18°	18½°	19.5	
Dry	Repose	17°	18½°	18½°	18½°	18½°	18½°	18½°	18½°	18½°	18½°	18.3°	0
	Slide	18°	19°	19°	19°	19°	19°	19°	19°	19°	19°	18.9°	
Wet	Repose	13½°	14°	14°	14°	14°	14°	14°	14°	14°	14°	14.0°	0 to 1.00
	Slide	14°	14½°	14½°	14½°	14½°	14½°	14½°	14½°	14½°	14½°	14.4°	
Chestnut Regular	Repose	19°	19°	18½°	19°	18°	17°	17°	18°	17°	17½°	17.9°	0.3
	Slide	21½	20°	19½°	20½°	18½°	18°	18°	18½°	18°	18½°	19.1	
Dry	Repose	18°	18°	18½°	18½°	18°	18½°	18½°	18½°	18½°	18½°	18.3°	0
	Slide	18½°	18½°	19°	19°	18½°	19°	19°	19°	19°	19°	18.9°	
Wet	Repose	14½°	14½°	14°	14½°	14½°	14½°	14°	14½°	14½°	14½°	14.4°	9 to 11.0
	Slide	15°	15°	14½°	15°	15°	15°	14½°	15°	15°	15°	15.0	
Pea Regular	Repose	19½°	19°	20°	20½°	20½°	21°	20½°	20½°	21½°	21°	20.5°	9.2
	Slide	21½°	20°	21°	21½°	21½°	21½°	21°	21°	21½°	22°	21.1°	
Dry	Repose	20½°	21½°	21°	20½°	21°	21°	21°	20°	21°	21°	21.0°	0
	Slide	21°	22°	21½°	21°	21½°	21½°	21½°	21½°	21°	21½°	21.4°	
Wet	Repose	22°	21°	22°	22°	22°	22°	22°	22°	22°	22°	21.9°	10 to 12.0
	Slide	23°	22°	23°	23°	23°	23°	23°	23°	23°	23°	22.9	
Breeze Regular	Repose	33½°	34°	35°	33°	30½°	31½°	32°	31½°	31½°	32°	32.4°	12.0
	Slide	34°	35°	36°	34°	31½°	32°	32½°	32°	32½°	33°	34.5°	
Dry	Repose	26°	29½°	27½°	27½°	27½°	27½°	27½°	27½°	27½°	27½°	27.6°	0
	Slide	27½°	30½°	28°	28°	28°	28°	28°	28°	28°	28°	29.3°	
Wet	Repose	35°	36°	36°	35°	35°	35°	35°	35°	36°	35°	35.4°	13 to 15.0
	Slide	36°	37°	37°	36°	36°	36°	36°	36°	37°	36°	36.4°	

Fig. 16.

Sale.—In most respects the sale of coke is no different from that of any other commodity, it being necessary to first have a suitable product to market, then promote a mutually profitable sale. Beehive oven coke is virtually limited to foundries and blast furnaces, and retort coke to domestic and small manufacturers purposes. By-product oven coke is sold for all purposes for which beehive and retort coke may be put, so its sale is here considered, as it most nearly covers the entire field.

In the marketing of foundry coke no time need be lost in looking up prospects, as lists, showing all foundries, may be had, so all energy, therefore, may be devoted to selling known users. Much pioneer work was done throughout the middle-West 5 or 10 years ago, in the introduction of by-product coke for foundry cupolas. A thorough test in one cupola of a community was usually sufficient to convince the foundrymen within a considerable distance of the value of by-product coke. Now, that the field has been covered, the work of the department of tests consists chiefly in giving advice to foundrymen whose results are not thoroughly satisfactory.

The prejudice against by-product coke, so long held by foundrymen, has been more completely banished than that in the minds of blast furnace men, many of whom still hold there is no substitute for beehive coke. The sale of blast furnace coke is a larger task than the sale of foundry coke; but, with proper co-operation between furnace and coke plant managements, mutually satisfactory contracts are most always possible.

The manufacturing uses of coke are so diversified that classifications of them should be carefully tabulated and sales made in a systematic manner, from class-to-class. A successful sale in one plant should easily pave the way for sales in others.

The greatest opportunities for development are in the domestic fuel market. The use of coke for domestic purposes is in its infancy, with anthracite the chief competitor. Direct educational advertising and descriptive matter distributed through dealers yield very good results. In Milwaukee, experts are employed to demonstrate the

merits of coke for domestic use, as was done for the foundry trade, and the value of this service is unquestioned. Initial sales to dealers are not more difficult to accomplish now, but repeat orders are seldom placed until the first car has moved out to customers.

In order to arouse the fuel dealer's interest exclusive agencies have been established with good results, for this has given the dealer assurance that the fruits of his missionary work would not go to others. Concessions in price during the summer months have also stimulated sales, as the dealer who has an investment to turn over naturally works diligently to do so. It required years of hard work to reach the consumers, and to so thoroughly acquaint them with the value of domestic coke as to make it obligatory upon fuel dealers to carry coke in stock as well as coal. Coke breeze would less often be a drug upon the market, were it sold by sales' engineers instead of ordinary salesmen; by competent engineers with sufficient funds to provide proper breeze burning equipment aad to make the necessary alterations in the prospective customer's boiler plant.

Many unsuccessful attempts at briquetting breeze for domestic fuel have been made, and if an equivalent amount of energy and money had been expended in a convincing, breeze-selling campaign by engineers, results would have been much more favorable to the satisfactory disposition of this product.

Petroleum again Breaks Record.

According to the U. S. Geological Survey, the great output of petroleum during each year of this century was more than maintained in 1913. The amount produced exceeded 240,000,000 barrels, or about 32,000,000 metric tons. The production in 1912, which made the record up to that time, was 222,113,218 barrels. The rate of increase in 1913 was greater at the end of the year than at the beginning. California increased at least 10,000,000 barrels, and the consumption in California almost equaled the production, the addition to stocks being very slight. The output of the Gulf field declined, but this was more than offset by the increases in northern Louisiana and Texas. Wyoming showed a significant increase from the Salt Creek field. Other States generally showed a decline, which was greatest in Illinois.

The following is an estimate of the production in barrels, compared with the statistics for 1912:

State.	1913.	1912.
California	98,000,000	86,450,767
Oklahoma	62,500,000	51,427,071
Illinois	22,000,000	28,601,308
Texas	14,000,000	11,735,057
Louisiana	12,000,000	9,263,439
West Virginia	11,000,000	12,128,962
Ohio	8,000,000	8,969,007
Pennsylvania	7,000,000	7,837,948
Wyoming	3,000,000	1,572,306
Kansas	2,000,000	1,592,796
Indiana	900,000	970,009
New York	800,000	874,128
Kentucky	500,000	484,368
Colorado	200,000	206,052
Other States	100,000	.....
Total	242,000,000	222,113,218

In New York and Pennsylvania great efforts were made to increase production by new drilling and by cleaning out old wells. No great success was obtained, and the usual decline resulted. A deep test boring at Derrick City, near Bradford, Pa., was carried to 5,673 feet with the hope of finding oil in the Medina sands, and is being continued.

In West Virginia no new pools comparable with the Blue Creek discovery of the previous year were opened. The possibilities of finding oil in western Kentucky aroused general interest.

Eastern Ohio was actively drilled with fair results, and in the Ohio River region an interesting innovation in handling old wells gave promise of beneficial conservation of old oil fields in the future. Compressed air was forced into the nearly exhausted oil-bearing sands through a well situated centrally in a group of old wells and the increase in yield was marked.

The decline in the Lima field was no greater than usual, and the new development in Sullivan County, Ind., added an encouraging new supply.

The entire Mid-Continent region showed an increase, with a record total output. In Kansas prospecting returned to many localities which had been temporarily abandoned. During last year the high prices asked for favorable locations in Oklahoma reacted in favor of Kansas. The phenomenal bonuses obtained in auctioning leases on Osage Indian lands showed the high value of Oklahoma lands. The oil also increased in price to $1.03 a barrel, and would have gone higher but for the excessive production, which put oil into storage and created uncertainty as to future prices. Besides satisfactory development of the new Cushing and Cleveland pools, interesting prospects for new pools have been found at Newkirk, Wann and Healdton.

As usual, many large wells, difficult of control, were obtained in the Caddo region, Louisiana, including Mooringsport, and fires were disastrous. The product was irregular but showed an increase.

Through the efforts of the Louisiana Conservation Commission, the United States Bureau of Mines, and the oil operators, the gas well near Oil City, which had run wild since the opening of the Caddo region, was closed.

The Electra and other fields in northern Texas continued to increase, and the decline in the Gulf region was slight. Much wildcatting was in progress at many points over the State. Chief interest centered in a new development at Moran, in Shackelford county.

Production increased in the Salt Creek field of Wyoming, and the erection of additional refineries was commenced. An important suit was begun by the Federal Government to recover oil lands entered upon since the first withdrawal order of former President Taft.

In California many of the wells of 1913, gushers of the phenomenal type, aided greatly in increasing the supply. The efforts to increase consumption succeeded fairly well, so that except during the month of greatest production (September), when about 9,000,000 barrels were produced, the consumption almost kept pace with the output and the amount sent to storage was less than a million barrels.

The Fullerton field continued to yield large gushers with sufficient frequency to justify the attempts to reach the unusually great depth of the oil sands.

Farther north the "west side" fields of Kern county continued as strong factors in the increasing output of the State, and the Buena Vista Hills, Elk Hills and other new districts gained in interest. Even the old Kern River field near Bakersfield sustained interest by wildcatting to the northwest, where the Standard Oil Co.'s well went into oil and aroused geologic and financial speculation over a large area. The product of the district declined.

Coalinga's year had many eventful features, including extensions of territory to the east and the discovery of additional deep sands yielding oils containing paraffin. The value of the field was indicated by the sale of the California Oil Fields, Ltd., to the Shell Trading and Transportation Co., an ally of the Royal Dutch Syndicate.

In transportation the new pipe lines of the General Petroleum Company over Tehachapi Pass, effected cheaper transportation to the south, and the natural gas line to Los Angeles was equally advantageous. Meanwhile several new tank oil carriers and oil-burning steamships were added to the Pacific Coast trade and aided in increasing consumption.

On account of the increased cost of fuel oil for battleships and the fact that foreign corporations are rapidly purchasing reserves of oil in the United States, the Secretary of the Navy has recommended to Congress the policy of producing crude oil from the naval reserves and obtaining fuel oil from it.

There has been unusual progress in many parts of the country during the year in petroleum refining, especially in the dehydration of heavy crude oils, in obtaining gasoline from natural gas and synthetically from heavy oils, and in obtaining many special products from crude oils.

The feature of chief interest in connection with the foreign petroleum industry in 1913 was the active prospecting for new oil deposits, extended to very remote regions, including South Africa, southern Chile, Patagonia, many islands of the Pacific, China, Japan and the East Indies. That of most interest to us was in the West Indies, Central America and South America. In Venezuela American capitalists were actively prospecting in many regions, chiefly along the northern border and on the adjacent island of Trinidad.

In Colombia, English, American and Canadian interests were concerned with concessions for the development of large areas where the seepages of oil and asphalt are so significant as to lead to the hope of a large addition to the supply of fuel oil. The Cowdray interests withdrew from Colombia in the later part of the year.

There was delay in developing the oil fields of Argentina, owing apparently to the desire of the Government to retain the oil as a national monopoly.

In Chile a governmental commission examined the oil and gas indications in the Magellan region and made a favorable report.

In Ecuador the Cowdray and other interests carried on a vigorous campaign for the acquirement of areas showing oil indications in the interior and in the region of the old wells near the coast.

Interest was shown in the possibility of finding oil in Panama, Costa Rica, Nicaragua and Honduras, but so recently that there has not yet been time for sufficient result.

Prespecting was active in Haiti, where a small oil well was drilled near Azua. In Cuba drilling was resumed near Havana, Cardenas and Motembo. Explorations for oil were also active in Barbados.

In Mexico development work was remarkably active considering the unsettled conditions. It resulted in the development of several large wells in the neighborhood of the great gusher at Potrero del Llano. Another large gusher was obtained at Los Naranjos, on the shore of Tamiahua Lagoon, which indicated a considerable addition to the total oil supply. The importance of these additions can not well be overestimated, for in spite of the universal judgment that the Mexican fields are potentially very great, so far as present supply is concerned Mexico has been practically limited to two or at least three large wells and not a very large number of smaller wells of uncertain character. Of the large wells the American (Doheny) interests owned two and the English (Pearson) one. As an evidence of the peculiar character of petroleum commerce, it is probable that with this additional supply the price per barrel will increase, because the greater confidence in the supply will stimulate the adoption of Mexican oil for refining and for fuel.

The 8-inch pipe line of the Mexican Eagle Oil Co. (Pearson interests) was completed from Potrero del Llano to Tampico, and the refinery near La Barra is nearing completion. Among many other interesting developments was the continued interest in the Topila field, where, in spite of many wells going to salt water, the occasional large gushers have stimulated continual drilling.

A feature of importance was the development of a large fleet of tank steamers for coastwise and trans Atlantic trade. Imports of Mexican oil were extended to several refining centers of the United States.

The general interest in the development of new oil fields extended to Alberta and Saskatchewan, in Canada. Although explorations in Saskatchewan gave either natural gas or entirely negative results, a well 27 miles southwest of Calgary, in Alberta, struck oil of very light gravity, and a large territorry in that region was taken up by prospectors. This oil excitement extended to the region north of Edmonton, where on Athabaska River and its tributaries, large bodies of so-called "tar sands" have been known for many years. These are in places 60 feet thick where exposed on the river banks and have been traced for considerable distance from the river. Seepages of oil are reported for as much as 400 miles to the north, and many thousands of acres of land have lately been taken up for oil development.

Work has continued in the natural gas, petroleum and oil bearing shales of New Brunswick.

In Russian the production declined significantly in the larger fields, but the Ural-Caspain field was actively exploited. About 30 miles from the shore large oil wells have already been obtained, and pipe lines are being laid so barges can be loaded and towed up Volga River without the reloading necessary for shipments from Baku. Exploration in this field north of the present wells has been extended over many miles and, while very spotted, gives promise of further development.

In Galicia deep boring is tending to check the decline in the supply, and exploitation has been carried forward in all regions where indications have been noted. It is probable that the Government of Hungary will develop the gas wells in the region of Kisarmas.

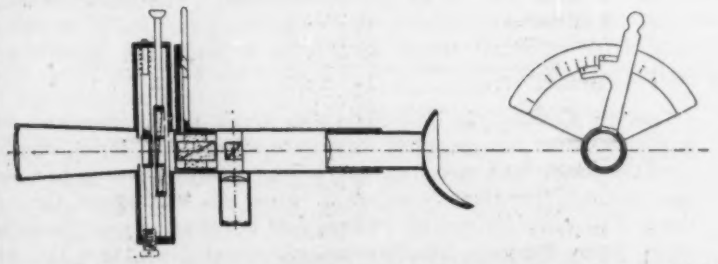
In Roumania oil production continued active in spite of the fire in the Moreni field. The chief contribution to the industry by the Government was a pipe line system from the fields to Constanza, on the Black Sea.

In Japan production was greatly helped by the introduction of the rotary system of drilling.

New Methods and Appliances.

THE HUMPHREY IMPULSE PUMP.—Tests of the Gas Impulse Pumps (Humphrey design), at Chingford, England, described in the JOURNAL of April 21st, 1913, have been reported by W. B. Bryan, Chief Engineer the Metropolitan Water Board, London. The capacity trials showed an average rate of 47.5 million gallons per day (compared with a guarantee of 40 million); the small pump raised at the rate of 26.1 million gallons (20 million guaranteed). The average fuel consumption of the large units was 0.931 lb. anthracite per water horse power hour (1.1 lb. guaranteed); the small unit showed 0.8 lb. These figures do not include coal used in raising steam for gas making, which was approximately 15 per cent. of the quantity of anthracite used. In making the fuel consumption tests, first the yield and calorific value of gas from the producers were determined and then the gas consumption of the engines. The producers were specified to yield 78 cubic feet of 150 B.t.u. gas per lb. of anthracite; it is reported that the figure "was exceeded." The endurance trials were delayed on account of low water in the River Lea, but they have since been carried out "with entire satisfaction."

THE "RADIUM" PYROMETER.—Herr W. Allner, of Dessau, describes in the *Journal für Gasbeleuchtung*, a new optical pyrometer for measuring the temperatures of retort benches. The instruments in use hitherto were based on the principle that light from a hot source increases rapidly with the temperature. Instruments of this class were put upon an exact basis by investigation of laws of radiation of a black body, as formulated by Planck. In a perfectly black body there is no reflection and no transmission of incident rays, hence the ratio of the emissive to the absorptive power is constant for all radiations of like wave lengths, for all bodies at the same temperature whose radiations are occasioned solely by the high temperature; and this ratio is equal to the emissive power of the perfectly black body for radiations of the same wave lengths. From this Wien and Lummer infer that a hot solid, hollow, with a minute aperture through its wall, will, respecting interior radiations through that aperture, act as an ideal black body; and it is experimentally ascertained that retort benches act very nearly in this ideal manner. Consequently it is permissible to measure the temperature by observing the intensity of the light of a selected color, emitted from inside through a small aperture, and comparing it with indications given by radiations from a perfectly black body. If J_1 and J_2 be the brilliancies per unit of surface of the perfectly black body at two known temperatures, T and T_2; and l be the wave length of the selected color of light used, the common logarithm of (J_1/J_2) is equal to $c/l\ (1/T_1 - 1/T_2)$; and the value of the constant c. Recent work shows the best value is $(14{,}370 \pm 40)$ in thousandths of a millimeter per C°. Given any two temperatures with corresponding observed brilliancies, and the wave length of the light used, the scale of the instrument can be plotted out for all other temperatures. In Wanner's pyrometers an electric incandescent lamp is used as a standard; the light selected for observational comparisons being the hydrogen red line, $l = 0.6563$ microns. In the Holborn and Kurlbaum instrument a wire is electrically heated until it disappears against the background of the hot interior the temperature of which is to be ascertained. Both these instruments are very exact. The Wanner is most in use, but as it is heavy and relatively expensive, something lighter, even if not quite as accurate, is wanted.



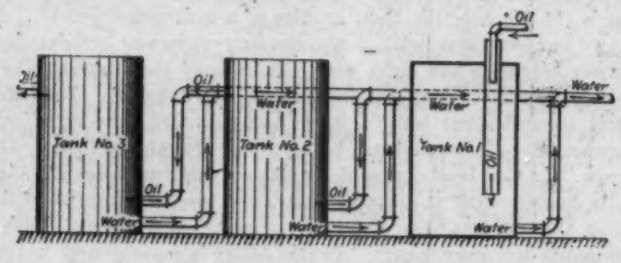
The new instrument made by Franz Schmidt and Haensch, Berlin, is called the "Radium" pyrometer because the comparison is made with a permanently luminous radium preparation. The selected light used is a green ($l = 0.535$ micron). The light from the source (the retort bench) is first passed through a green filter screen, then through a lens on its way to a Lummer-Brodhun photometer head, the other half of the disk being lit by the radium preparation. Between the lens and the Lummer-Brodhun is a pair of graduated smoked glass wedges to cut down the light, and a fine graduated adjustment by means of a pair of Nicol prisms. The fields of view are not bright, hence a hood is used to cut off stray light. It is found that the green filter screen gives results of sufficient accuracy, so there is no need of spectral analysis of the light transmitted.

The standardization of the instrument needs a hot "perfectly black body." For this, heating by gas with flameless combustion was adopted. The heating-up, which occupies from 1 to 1½ hours, consumes about 88 cubic feet of gas per hour; the continued heating consumes about ⅓ this quantity, or rather less; and good jacketing would reduce these quantities materially. The temperature of the whole "black body" is very uniform, can without difficulty be kept constant for hours, and can be adjusted controlling the gas supply, maintained at any value, from 900° C. to 1400° C.

With the aid of the "black body" at different temperatures the radium photometer can be standardized. A perforated sheet of

abestos protects the instrument against radiant heat from the casing; the radiations from the interior of the "black body" passing through a water cooled diaphragm, 0.4 inch in diameter, then along a tube, 0.4 inch in diameter, in front of which the instrument is placed in such a position that the field of view is completely filled. Careful measurements show the results work out remarkably true, especially at 1,105° C.; and, taking these as a basis for calculating the theoretical curve, the data obtained at other temperatnres fall into their places with great accuracy. On logarithmic paper they give very good approximations to straight lines. Comparisons made between "Radium" and Wanner pyrometers show satisfactory agreement. The light from the radium preparation decreases by about 20 per cent. in 12 months; but it is easy to measure its brightness from time to time against a standard amyl-acetate lamp with matt screen, as is done in Wanner's pyrometer; and after a year or so the radium preparation can be renewed. No trouble has arisen from rays injuring the eyes of the observers, since the radium rays do not strike the eyes, and cannot be refracted into them, and the optical glasses used absorb any injurious radiations.

WATER TANK GRAVITY OIL FILTER.—An inexpensive oil filter, in the station of the East Liverpool (O.) Traction and Light Company, embodying the ideas of Mr. J. S. Murphy, is giving excellent results. The used oil and water entering at the top of tank No. 1 are conducted to a point near the bottom, the oil rising through the water by gravity. The pipes which carry off the waste water and the separated oil are at the same level, so that, when the tank becomes full, water and oil will flow from the outlet simultaneously. Some water is still retained by the oil after it has passed the first tank, but as the process is repeated in tanks No. 2 and No. 3 the percentage of moisture



and other impurities is reduced to a quantity practically negligible, when the oil is used as an engine lubricant. The pipes for waste water are at the same level as those which conduct the oil from one tank to the other. If warm water is fed to one of the tanks it will facilitate the action.

TESTING METERS.—In Rotterdam they found, that in standardizing new or repaired meters, when they were arranged in series, one behind the other, each meter gave a reading less by about $\frac{1}{10}$ per cent. than the one immediately before it, when gas was passed through them. But when air was afterwards used in the same way the differences were reversed. On investigating it was found that the gas, made to pass in succession through 6 dry meters with new diaphragms, lost 0.47 per cent. of its volume through the absorption of heavy hydrocarbons from it. The conclusion was that in standardizing dry meters a correction should be applied for this loss in volume by absorption.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,080,705. Curb and Holdfast for Gas Purifiers. E. F. Lloyd, Detroit, Mich.

1,080,808. Apparatus for the Production of Gas from Sewage. C. Birault, Paris, France.

1,080,838. Gas Furnace. A. H. Lewis, Bellevue, O.

1,080,938. Recovery of Tar and Ammonia from Coal Gas. C. Still, Recklinghausen, Germany.

1,081,219. Gas Igniter. J. L. Ducharme, Schenectady, N. Y.

1,081,241. Gas Washer. A. H. Lyman, Westminster, England.

1,081,343. Mica Cylinder for Inverted Gas Mantles. A. P. Storrs, Owego, N. Y., assignors to Storrs Mica Co., same place.

1,081,455. Method of and Apparatus for Washing and Cooling Gas. E. F. Lloyd, Detroit, Mich.

1,082, 117. Gas Generating Apparatus. C. M. Garland, Chicago, Ills.

1,082,216. Trap for Gas Mains and the Like. S. A. Stum, San Francisco, Cal.

1,082,238. Gas Heater. C. J. Rhodin, San Francisco, Cal.

1,082,712. Automatic Thermal Cut-off for Gas Burners. A. Tibbs, Uniontown, Pa., assignor of one-half to J. F. Page and one-fourth to W. P. Henderson, same place.

1,082,725. Gas Burner, J. Antonuccio, Oakland, Cal.

1,082,797. Means for the Maintenance of Gas in Confinement. S. E. Bretherton, Berkeley, Cal.

1,082,954. Valve Mechanism for Gas Lamps. F. J. and H. C. Humphrey, Kalamazoo, Mich., assignors to General Gas Light Company, same place.

1,082,955. Gas Lamp. A. H. Humphrey, New York city, assignor to General Gas Light Co., Kalamazoo, Mich.

1,083,067. Gas Producer. N. F. Egler, Chicago, Ills., assignor to the Blair Engineering Co., same place.

1,083,068. Gas Cleaning Mechanism. N. F. Egler, South Chicago, Ills., assignor to the Blair Engineering Co., Chicago, Ills.

1,083,233. Method of Treating Gases. C. A. Weeks and R. M. Hunter, Philadelphia, Pa., assignors to T. R. Patton and F. C. Mencke, same place.

Items of Interest
FROM VARIOUS LOCALITIES.

"H. M. F., writing from Revere, Mass., under date of the 9th inst., says: "The annual New Year's dinner given by the local Employees' Association, of the Suburban Gas and Electric Company, of Revere and Winthrop, was held the evening of the 6th inst. Covers for 60 were laid in the garage annex, which was transformed for the time into a banquet hall, the effect of which was greatly heightened by 'streamers' of electric lights, the festooning of American flags, eked out by other decorations symbolic of 'Tenney Service.' After a full course, New Year dinner, prepared by our own employees and cooked on gas ranges, the hall was cleared for the entertainment. This consisted of moving pictures, the rendering of songs and the use of slides showing the volume of business done during the year. Mr. Geoffrey Whalen, one of the stars of the Olympic Circuit, entertained with several impersonations, and concluded by giving one of his celebrated talks on a feature photo play dealing with the Northwest Mounted Police. Among the invited guests present were: First Vice-President, A. B. Tenney; Treasurer, E. A. Bradley; General Manager, H. T. Sands; General Superintendent, A. E. Bliss—all of the C. H. Tenney forces."

MR. W. H. BEADLEY, Manager of the Springfield (Mass.) Gas Light Company, on the occasion of Mr. Frank A. Rivers' induction to the Mayoralty of Chicopee, Mass., informed that official that, dating back to the first inst., the gross rate for gas used in Chicopee would be $1.10 per 1,000, with a discount of 15 cents for prompt payment—within 15 days.

MAYOR J. W. FLEMING, of Brandon, Canada, acting for the Continental Gas and Electric Company, of Cleveland, O., has applied to the authorities of Saskatoon, Saskatchewan, for a franchise to there construct and operate a gas plant. He asked for a 30-year franchise life, and agrees to have the plant in operation within 18 months after the signing of the grant.

MAYOR LENNON, of Yonkers, N. Y., has directed the Corporation Counsel to make formal appeal to the Public Service Commission, Second District, for an order directing the Westchester Lighting Company and the Yonkers Electric Light and Power Company to make a sensible reduction in their respective selling rates for the Yonkers district of Westchester County.

MR. W. J. BARKER, General Manager, the Denver (Col.) Gas and Electric Company, has been authorized to make issue to the public of the named city this notice: "The Denver Gas and Electric Light Company is pleased to announce a reduction of 5 cents per 1,000 cubic feet of gas on bills rendered on and after February 1, 1914. This makes the price of gas 80 cents net a 1,000 cubic feet for residence consumers, and 54 cents a 1,000, plus the small fixed charge for industrial uses."

MR. HERMAN RUSSELL, Superintendent of the gas manufacturing division, the Rochester (N. Y.) Railway and Light Company, is to be complimented over the excellent showing made in 1913. The gas

output for 1913 totalled 1,595,468,000 cubic feet, representing a percentage gain over 1912 of 5.3. Estimating the population of Rochester at 250,000, the output shows an average use per year of 6,380 cubic feet for each head of population. All of which is proof of the get-at-it qualities of Mr. Searle and his staff, the guiding spirit of all being activity with harmony.

MR. E. M. WALKER, the capable and untiring General Manager of the Union Electric Company, of Dubuque, Iowa, writing to the JOURNAL, under date of the 8th inst., writing in connection with our mention some weeks ago respecting the delay in making contracts for street lighting, notes that such mention was decidedly misleading. Continuing, Mr. Walker says: "The reason the matter has dragged along * * * is readily explainable. The City Council has had a big lot of work before it * * * incident to the closing of the year, and put off final settlement of the street lighting matter as of minor importance. * * * I do not want you to get a wrong impression of the standing or attitude of this Company since I became its Manager. With the very kindest regards to my old friends, and assuring you that, though not now in the gas business, I get a good deal of pleasure each week out of the JOURNAL."

THE inclosure forwarded by Mr. Walker is appended: "All night and every night street lighting will cost Dubuque from $5,000 to $7,500 more than it cost to light the streets in 1913 under the moonlight schedule. The additional lights to be installed in places not now illuminated will bring the total in excess of 500. Say, though, that such is the number, the cost for arc lighting will be $33,375 for the twelvemonth. It will cost $100 more to light the corner boulevard lamps from midnight until morning. The lighting fund for 1913 was $29,500. Considering these sums the city will have to expend an additional $5,000 yearly to obtain all and every night lighting. If more than 500 arc lights are maintained the cost for each additional one will be $62.50. By the terms of the contract, approved by Council committee of the whole, the city will pay $67.50 a month for each light, up to 425, and every light over that number will cost $62.50. Corner boulevard lamps will be maintained, from midnight until daylight, at a cost of $2.75 each per month."

IN a statement made by General Manager R. B. Brown, of the Milwaukee (Wis.) Gas Light Company, which statement was published in the newspapers of that city, Mr. Brown narrates some of the things done by the Company in 1913. It completed and opened to the public a commodious and attractive salesroom, wherein all things new and good in gas appliances are fittingly displayed. It extented its mains to and through the districts south of Kinnickinnic river, and east and west of Eighth avenue, with lengthy extensions in the factory district, centering on Burnham street and going to West Allis on the northeast. Extensions were also made to the fast developing residential places on the outskirts. It has built substantial concrete docks, and in the third ward plant has installed a large purifying plant, equipped with modern machinery. Experimental work on a large scale was carried on respecting methods of heating houses, which work, although not decisive in the main, nevertheless demonstrated good advances towards a substantial solution of the problem. In the year the lengthy and painstaking investigations of the business by the State Railroad Commission were concluded, and the already low rates for gas were still further lessened. As to general policy the Company's practices remained unchanged, the corporation being always engaged in the study of advancing its prosperity through improving its service to the consumer.

THE Engineering Society, the Stevens Institute of Technology, the afternoon of the 7th inst., enjoyed a useful and instructive visit to and through the Market street (Newark, N. J.) plant of the Public Service Gas Company.

THE proprietors of the Modesto (Cal.) Gas Company signalized New Year day by announcing to the residents that hereafter the net minimum gas rate will rule at $1.48 per 1,000 cubic feet, a concession of 32 cents.

"A. C. H.," writing from Key West, Fla., under date of the 7th inst., incloses this: "S. P. Veeker, Manager of the Key West (Fla.) Gas Company was, on Christmas Eve, presented with a handsome gold watch by the employees of the Company. The presentation was made in recognition of the earnest co-operation of the Manager with those who work for the Company, co-incident with the zeal and interest displayed by him in making the conditions of the working force as pleasant as possible."

MR. RICHARD R. YOUNG, formerly Division Agent, Public Service Gas Company and Public Service Electric Company, New Jersey, was recently appointed Business Agent, for State of New Jersey, of both named corporations.

WE have cards announcing the marriage (Sunday, the 11th inst.) of Amanda Veronica (daughter of Mrs. Mary A. Hyde) to Mr. William Wallace Barnes. Mr. and Mrs. Barnes will be at home (31 Chelsea Place, East Orange, N. J.) after the 15th prox. *Nemo solus sapit!*

WILLIAM D. MARKS, whose connection with the gas industry was noted by his many testifyings that the rates by the different companies against which he testified were always excessive, died in a Plattsburgh (N. Y.) hospital the evening of the 7th inst. He was in his 65th year, and some years ago was Whitney Professor of Dynamic Engineering, the University of Pennsylvania. If we mistake not he was in the late 80's electrical engineer of the traction system of Philadelphia. He was an Honorary Member of the Franklin Institute, and was also on the membership rolls of the American Gas Institute and of the Am. Institute Electrical Engineers.

"B. R. M.," writing from Gainesville, Fla., under date of the 9th inst., says: "Not having read anything in the JOURNAL regarding that which was so happily done by Mr. J. W. Reeve, the go ahead, well-liked Manager of the local Gas and Electric Power Company, I chance this slight mention thereof. The date was the night of December 27th, the place was his residence, the host was Mr. Reeve, the guests were the employees of the Company, the happening was a well-cooked, well served turkey dinner, and the result was a most enjoyable sitting. Following the dinner a 'smoker' was gone on with, in the course of which certain subjects of natural interest to the Company (and the men, too) were interestingly discussed. The guestes included Messrs. F. B. Jones, W. D. Webb, Rex Evans, Frank Gardiner and H. G. Kirkland."

THE Treasurer of the Western United Gas and Electric Company has called for redemption, at par, interest (to the first prox.), and 2 per cent. premium, its entire outstanding gold debenture issue (save those maturing the first prox.) to be redeemed on presentation at the counters of the First Trust and Savings Bank, Chicago, the first prox., and thereafter. The redeemable debentures bear these numberings: A 186 to A 545; B 31 to B 111.

MR. R. E. TURRENTINE, since 1900 in the employ of the Houston (Tex.) Gas and Fuel Company, first as Clerk and later on as new business manager, and successful in all his relations with the Company, has resigned from its service. He retires from the field in which he so well served to become actively engaged in the grocery business conducted by the firm of Lazarus & Turrentine. His successor with the Gas Company is Mr. Harry E. Danner, well-known from his connection with the commercial division of the properties of Messrs. Henry L. Doherty & Co.—H."

MR. HOWARD S. MCNAIR, formerly Assistant Treasurer and Secretary of the New Orleans Railway and Light Company, is now the active head of the engineering division of the United Gas and Electric Corporation. He is a native of New Orleans, La.

THE staff of the Electrical Testing Laboratories Corporation, New York City, has been changed to this arranging: President, J. W. Lieb, Jr.; Vice President, Clayton H. Sharp; Treasurer, Jos. Williams; Secretary and General Manager, Preston S. Millar; Chief Engineer, F. M. Farmer.

THE City Commissioners of Logan, Utah, have consented to an extension of the franchise under which P. S. Campbell and associates were granted the right to construct and operate a gas works. The concession goes to July 1, 1914, in so far as starting-progress is made on the distributing system, with a further twelve month in which to complete the plant, ready for gas making. They are also required to file a bond in the sum of $1,000.

The Market FOR GAS SECURITIES.

In common with the general share list, Consolidated shares gained a fair advance in quotation, an advance that was also accompanied by trading on a fairly large scale. The opening to-day (Friday) was made at 132½ to 132¾, to all intent a gain of 2½ for the week. Another thing worthy of note is that trading on Exchange account has increased largely. For instance, the sales yesterday were returned at 1,200 shares. The bond market continues active, with quite a firmer tone in respect of the bid. The annual meeting of the Consolidated will be held the 26th inst.

Brooklyn Union gas is also on the up-turn, the quotation this morning being 123½ to 124, or a gain of 2 points for the week in the bid. The Company's growth continues to be most satisfactory, especially in regard to its send-out on domestic account. Possibly this increase is traceable to the moderm methods adopted by the Corporation in the past year or so.

In the general market, positive signs of re-awakening are manifest. Peoples, of Chicago, sold yesterday at 124½, and a like figure was bid for it this morning. The Company is preparing for a brisk campaign this spring on fuel use account, and great as was the increase in trading in this respect last season, the new business men of the Company are declaring that the record for 1914 will surpass that of 1913.

Refunding 5's, Chicago, are in good demand, and during the week, a block of Chicago 5's was sold at 101. The regular quarterly of 2 by the Peoples is declared payable the 25th prox.

The Baltimore Company has decided to issue new stock to the par value of $1,416,000, which will bring the common to the total of $9,216,000. The plan is to offer to current holders the new stock at par, in the ratio of 1 to 10, and the stock remaining untaken on these terms will be underwritten by a syndicate on the par basis. We believe, however, that the syndicate will not have very much to take over.

These stock increases are asked by the named Massachusetts Companies: Newtown and Watertown, 2,500 shares, at $150; East Boston, 14,650, at $37.50 (par $25); Citizens (Quincy), 3,900 shares, at par. The Brazilian Traction, Light and Power, quarterly of 1½ is payable the 20th prox.

The malcontents in connection with the coming annual of the Washington (D. C.) Company, to be held the 2d prox., are moving mightily to have the Board comprise 15 members, instead of 7. The proposed number should certainly be sufficient for all time to come.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

JANUARY 19.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$99,816,500	100	132½	132¾
Central Union Gas Co.—				
1st 5's, due 1927, J. & J.	3,500,000	1,000	101	103
Mutual Gas Co.	3,500,000	100	157	157
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	99	101
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	59	62
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98½	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	98	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	100	102
Standard	5,000,000	100	102	104
Preferred	5,000,000	100	93	94
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	91	95
The Brooklyn Union	15,000,000	1,000	123½	124
1st Con. 5's, due 1945, M. & N.	15,000,000	—	102	103
Yonkers	999,650	500	180	—
Out-of-Town Companies.				
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	133	136
Fort Wayne	2,000,000	—	—	
" Bonds	2,000,000	—	55	—
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	509,000	1,000	97	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Chicago Gas Co. Guaranteed Gold Bonds	7,860,000	1,000	104	106¼
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	94	96
Bonds	75,000	—	—	100
Cincinnati Gas and Electric Co.	29,500,000	100	47	60
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus Gas Light & Fuel Company	1,982,750	100	65¾	66¼
Preferred	3,026,500	100	33	35¾
Consolidated, Baltimore	13,460,084		118¾	119
Mortgages, 5's	3,400,000	—		—
General Mortgage 4½	10,661,000	—		—
Con. Gas Co., Baltimore City, 4½	2,751,000	—		—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Laclede Gas Co., St. Louis.	10,000,000	100	94½	95
Preferred	2,500,000	100	—	102¾
Bonds	10,000,000	1,000	102¾	103
Madison Gas and Electric Co. " 1st Mtg. 6's	400,000	1,000	108	
Massachusetts Gas Companies, of Boston	25,000,000	100	91	92
Preferred	25,000,000	100	91	92
Montreal L. H.& P., Canada	9,000,000	100	216	217
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	124½	125
1st Mortgage	20,100,000	1,000	102	102½
2d "	2,500,000	1,000	104	—
Pacific Gas and Electric Co.	15,500,000	—	37	38
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	105
Extension, 6's	600,000	1,000	113½	115
General Mortgage, 5's	3,447,000	1,000	94	96
United Gas Imp. Co.	55,502,960	50	168	169

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

Alabama Light and Traction Company.—Annual meeting, May ——1914. Officers, President, R. L. Ellis, Selma; Treasurer and Secretary, H. O. Hanson, Mobile.

American Gas Institute.—Annual meeting, New York, October 21, 23, 1914. Officers: President, W. H. Gartley, Philadelphia. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting————1914. Officers: President, A. A. Dion, Ottawa; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.—Annual meeting, New York City, Oct. 1914. Officers: President, J. T. Hutchings, Rochester, N. Y.; Secretary, C. H. B Chapin, 29 W. 39th street, New York City.

Gas Meters.—Monthly Section Meetings; Grand Commissioner, Will. W. Barnes, East Orange, N. J.; Gen'l Sec'y, H. Thurston Owens, La Crosse, Wis.; New York Section, Chairman, W. H. Pettes; Secretary, G. E. Smith, Sipp Avenue, Jersey City, N. J. Philadelphia Section; Chairman, Stanley Grady; Secretary, H. E. Stiteler, Broad and Arch streets. Cleveland Section, Chairman, F. B. Hutchinson; Secretary, Wm. Holtz, East Ohio Gas Co. New England Section, Chairman, T. W. Jennings, Boston; Sec., F. K. Wells, 69 Broad street, Boston. Winona Section, Winona, Minn., W. F. Clausen, Chairman. Bethlehem Section, Trueman Weithnecht, Chairman; Sec.-Treas., Truman Buss, South Bethlehem, Pa. Wisconsin Section, C. H. Wiggers, Chairman; A. A. Ott Secretary, Milwaukee, Wis.

Guild of Gas Managers of New England.—Annual meeting, March, 1914. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, March 18th and 19th, 1914. Chicago, Ills. Officers: President, W. F. Barrett, Chicago, Ills.; Secretary-Treasurer, Horace H. Clark, 115 No. Oak Park avenue, Oak Park, Ills.

Illuminating Engineering Society.—Annual meeting, Cleveland, O., September, 1914. Meetings of Sections, monthly. Pres., Charles O. Bond; General Secretary, J. D. Israel, 1000 Chestnut st., Philadelphia, Pa. Sections: New York, Secretary, C. L. Law, 124 West 43d street. New England, Secretary, C. M. Cole, 116 Pearl street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Counties Gas & Elec. Co., Ardmore, Pa. Secretary, J. R. Jackson, 28 North Market street. Pittsburgh, Secretary, Alan Bright, 827 Wabash Bldg., Pittsburgh, Pa.

Indiana Gas Association.—Annual meeting, March 11 and 12, 1914. Terre Haute. Officers: President, A. S. Cooke, Terre Haute; Vice-President, A. C. Blunn, Evansville; Secretary-Treasurer, Philmer Eves, Indianapolis.

Institution of Gas Engineers.—Annual Meeting, Liverpool, England, June 16. President, Edward Allen; Secretary, W. T. Dunn.

Iowa District Gas Association.—Annual meeting, Davenport, May 27, 28, 29, 1914 Officers: President, B. C. Adams, Lincoln, Neb.; Secretary, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, October—— 1914. Arkansas City. Officers: President, Al. Newman, Arkansas City; Secretary and Treasurer, Ivan Thomas, Wichita Kas.

Michigan Gas Association.—Annual meeting, September, 1914. Place, undetermined. Officers: President, H. W. Douglas, Ann Arbor, Mich; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1914. Mexico, Mo. Officers: President, P. A. Bertrand, Joplin, Mo.; Secretary and Treasurer, P. W. Markham, Brookfield, Mo.

National Commercial Gas Association.—Annual meeting, Dec. ——1914, Minneapolis, Minn. Officers: President, P. S. Young, Newark, N. J.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, St. Louis, Mo., May 19 and 20, 1914: Officers: President, E. L. Brundrett, Kansas City, Mo.; Secy-Treas., T. Clive Jones, Delaware, O.

New England Gas Association.—Annual meeting, February, 18th and 19th, 1914. Boston Officers: President, T. H. Hintze, Providence, R. I.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—Next Meeting, —— ——, 1914, Asbury Park N. J. President, C. F. Butcher, Freehold, N. J.; Sec'y-Treasurer, O. F. Potter, Newark, N. J.

Ohio Gas Association.—Annual meeting, February ——— 1914 Columbus, O.; President, John M. Garard, Columbus, O.; Secretary, L. B. Denning, Columbus, O.

Oklahoma Gas, Electric and Railway Association.—Annual meeting, Oklahoma City, May, ——1914. President, F. E. Bowman, Ada; Secretary-Treasurer, H. V. Boze, Oklahoma City.

Pacific Coast Gas Association.—Annual meeting, Long Beach, Cal., September ——— 1914. Officers: President, C. S. Vance, Los Angeles, Cal.; Secretary-Treasurer, Henry Bostwick, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, Allentown, Pa., April ———, 1914; Officers, President, J. A. Frick, Allentown, Pa.; Secretary-Treasurer, W. O. Lamson, Jr., West Chester, Pa.

Society of Gas Lighting.—Annual meeting Dec., 11, 1913: monthly meetings, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 29 West 39th street, New York city.

Southern Gas Association.—Annual meeting, Mobile, Ala., April 22, 23, 24, 1914, Officers: President, James Ferrier, Rome, Ga.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting, May 22, 23 and 24, 1914, Galveston, Tex. Officers: President, G. H. Gifford, Fort Worth Tex.; Secretary-Treas., J. D. Walker, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 20, 21, 22, 23, 1914, Milwaukee, Wis. Officers: President, Ewald Haase, Milwaukee, Wis.; Secretary-Treasurer, Henry Harman, Milwaukee, Wis.